FOOD INDUSTRIES

manufacturing and processing

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From the Department of Commerce to the White House

INDUSTRY AND COMMERCE are the keynotes of American purpose and American prosperity. Appropriate it is, therefore, that a President of the United States should have served an apprenticeship, as it were, as Secretary of the Department of Commerce. Mr. Hoover's organizing and administrative ability found ample scope while he held the position of director of that important branch of the government's activities from 1917 until shortly after his nomination for the Presidency, and American industry benefited as a direct result of his efforts to effect avoidance of manufacturing waste, elimination of superfluous variety, and recognition of the importance of efficient methods and modern equipment.

Hardly had the applause following the election died away before Mr. Hoover was again "on the job," giving evidence of that industrial awareness and constructive statesmanship that brought him into world prominence. Having secured a nation-wide vote of confidence in favor of a broad-minded catholicity of viewpoint, he planned to spend a considerable portion of the time elapsing before his inauguration in a visit to some of the few foreign countries of which he lacks first-hand knowledge, choosing, with tact and wisdom, Central and South America, and thereby setting a precedent that has met with an instantly favorable response from all the great countries to the south.

The significance of this good-will journey cannot well be overestimated. Mr. Hoover's sincerity of purpose and deep knowledge of world conditions will gain many friends for the United States. His visit will dispel much of the uneasiness and suspicion that arose in days gone by. Mr. Hoover will convince those with whom he comes in contact that prosperity is not the prerogative of any one American country, and that it is the earnest desire of the United States to co-operate to the end that the greatest stability of sovereign independence and the highest practicable standard of living shall prevail throughout all the Americas.

Stimulation of international commerce offers the best opportunity for closer and more friendly relations, and Mr. Hoover's mission will do much to effect this. The food industries of the United States should benefit as a result of a wider recognition of the fallacy of taxing imports for revenue instead of solely for protective purposes—a policy that often converts a cheap, wholesome, and attractive exported article of diet into an imported luxury within the reach of none but the wealthy. Vast quantities of South American products find their way to the United States, yet to outfit for a journey from any large South American city means the purchase of prepared and canned foodstuffs mostly of European origin.

The opportunity for increased sales abroad is obvious, but quality and price are not the only criteria that are applied. He who would succeed in the foreign field must abandon the idea that South America is nothing more than a convenient dumping ground for surplus production. He must study the market intelligently, and the preferences—persons of a provincial mind would call them idiosyncracies—of foreign customers. Mr. Hoover's journey of good will, and observation, will provide much that will help to interpret this opportunity; and the outcome, one may feel sure, will be of interest and value to American manufacturers.

Caution Needed in the Commercialization of Vitamin D

BECAUSE of the fact that vitamin D—and that vitamin alone among the five so far identified—has been produced artificially and is available commercially it is arousing considerable interest, particularly to manufacturers of cereal foods. Research along this line has been recommended to food manufacturers as a precaution against a possible future loss of markets. Before embarking upon a wholesale plan of offering for sale foods which are to be highly potent in vitamin D, however, manufacturers should be certain that they are going to confer a benefit both on infant humanity and on themselves. Though there may exist the desirability of treating a food to the extent that it will not be in a commercially vulnerable position, there is also the question of how far corrective measures should be utilized.

Scientific and medical opinion has yet to be satisfied as to the benefit of an abundance of vitamin D in foods. Many feel that the subject is too new and too little understood to warrant its commercialization. The restrictions surrounding the administration and licensing of the Steenbock patent may, perhaps, be partially interpreted as a safeguard in this respect, but more experiments to prove that overdoses are harmless are necessary.

The *Journal of The American Medical Association* of October 13 urges caution upon the medical profession in the use of concentrated doses of substances containing vitamin D for fear of hypermineralization of tissues brought about by its use in too great amounts.

This advice to physicians should receive careful con-

sideration by all concerned. It is immaterial whether the administration of vitamin D is undertaken as a matter of routine diet or under a physician's instructions unless it is definitely known that the food product or other substances containing it also contain standardized amounts of the vitamin that are distinctly beneficial.

It is probable that commercial irradiation of foods for the purpose of activating them in this respect will not generate this vitamin in more than minute amounts, but it happens that direct irradiation of a food is only one of several methods of supplying a possible vitamin D deficiency. New methods are being developed at a rate that causes one to hesitate to assign any definite figure to the number of methods that are available at this time. Certainly it would appear that plenty of this curious substance will be available in one manner or another for all who are interested in it, regardless of restrictions that may be drawn by those who may be in control of the use of any single method.

What amount of vitamin D in foods will be best for children if, presently, practically every food may be supplied with it? If the food manufacturer is to obtain the vitamin in the form of a concentrate will he be certain of its uniform distribution throughout his product? Only research can answer these questions and at present the only known method of measuring the potency of a food is by the slow process of carefully controlled feeding experiments. Such experiments, performed usually upon rats, may tell the story in a much shorter time than the feeding experiences of mothers could possibly inform the public at large, but clinical tests are essential. Without them, although we may know the proper rat dosage, we do not know the proper child or human dosage.

Some of the more forward-looking manufacturers have already been at work nearly two years upon these problems. Others are just beginning. There is no occasion for excitement. Let us be willing to wait for the research necessary to sound judgment.

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EARLIER in the year one of the San Francisco radio transmitting stations broadcast a warning against the use of aluminum cooking vessels lest cancer result therefrom; at present we are in the midst of a whispering campaign to the general effect that the Walter Reed Hospital, the Battle Creek Sanitarium, and St. Mary's Hospital, maintained by the brothers Mayo, of Rochester, Minnesota, have discontinued the use of aluminum cooking utensils because of the toxic qualities of that metal.

To the Pacific coast challenge to professional candor, Dean Langley Porter of the medical school of the University of California promptly responded, in substance, that there is no evidence of any kind to suggest, to those trained in medical science, that aluminum has any connection with cancer. To the *vive voce* propaganda of the Eastern seaboard, and elsewhere, no official disclaimer has been made, although it is equally lacking in verity. Not only are the institutions mentioned still cooking with aluminum, but not long ago the new Presbyterian Hospital of the Medical Center of New York was completely outfitted with aluminum ware.

That the matter has been discussed in Nebraska is evidenced by a letter sent on September 18 by a member of its state medical association to the Bureau of Home Economics of the federal Department of Agriculture, asking for definite word as to possible dangers lurking in the use of aluminum in the preparation of food. The reply from Washington included statements to the effect that the bureau was constantly being interrogated by housewives as to any possible relationship between the use of aluminum ware and cancer or other diseases; that "there is nothing to be feared from the use of aluminum cooking utensils in the home"; that those who want the facts so far as they are now known may find them in an article on aluminum compounds in animal and plant physiology by E. V. McCollum, O. F. Rask, and J. Ernestine Becker, in the May issue of *The Journal of Biological Chemistry*, and "Metals in Our Foods," by F. B. Flinn and J. M. Incuye, in the March 31, 1928, issue of the *Journal of the American Medical Association*.

The well-informed food technologist knows that aluminum is an entirely safe material for use in all ordinary processing operations, and acts accordingly. To those whose duties include the dispelling of the miasmas of indefinite innuendo generated every so often by quasi-scientific zealots of one sort or another, the present moment affords the opportunity to counsel reliance upon sales arguments more in keeping with the facts.

Legal Differentiation Between Process and Product Patents

JUDGE RELLSTAB of the United States Court for the District of New Jersey has recently ruled to the effect that a process patent is not circumscribed as to legal redress for infringement by previous decisions of the Federal Courts dealing with mechanical or product patents, in which it was held that either the article in question must be marked "patented" or that notice of infringement must be given before suit for recovery of damages may be instituted. This decision is one of far-reaching consequences and is particularly timely and welcome because, speaking generally, it relieves the patentee of an inequitable burden hitherto imposed upon him.

The decision was rendered in a suit brought by Theodore B. Wagner against the Corn Products Refining Company and is based upon an alleged infringement by the company of U. S. Patent No. 835,145, issued to him in 1906, which, it is contended, is the basic patent for producing pure dextrose by crystallization in motion. That particular product of corn is said to be the most profitable individual revenue-producer of the corn products industry. The infringement is claimed to have been committed during the last two years of the patent's life and after Dr. Wagner had severed his association with the Corn Products Refining Company. The result of the present decision—which is quoted *in extenso* elsewhere in this issue—is to permit the case to go to trial on its merits.

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Rubber and sugar offer additional examples. British control of rubber production has ceased, and an international control of sugar production was abandoned recently because of the unwillingness of producers in widely separated areas to subject themselves to a uniform policy dictated by world market conditions. Conflicting reports appear in the daily press relative to the Brazilian coffee situation, and price control without production control appears to have brought matters to a crisis. Doubtless Mr. Hoover will hear some ably presented explanations on his South American tour, if he visits São Paulo.

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Use of Byproduct Power Effects Operating Economies

ELECTRIC power may be generated in many food-manufacturing establishments at a low cost if large quantities of steam are needed for cooking and processing. A significant economy is possible, because only about one-fourth of the heat units in high-pressure steam is utilized when generating power by means of a steam turbine or a reciprocating engine of high efficiency.

The conditions requisite to the utilization of byproduct power are, first, that the plant must need electric power and process steam in proportions that are roughly equal, and, second, that operations be on an adequate scale. Plants having a coal consumption greater than two carloads per month are in a position to utilize this system. Secondary conditions necessitate that the boilers be capable of carrying steam pressures of about 160 pounds, and that the required process-steam pressure be not over about 60 pounds, but much depends on the differential between the high and low pressures, and decisions should be made only after a thorough study of local conditions and needs. Practice has demonstrated, however, that for the low cost of about one-half cent per kilowatt-hour a plant may generate its own electric power, using a bleeder engine or a bleeder turbine, in place of a reducing valve, to reduce the steam from high to low pressure.

Considerable savings have been made in progressive food factories by the utilization of the same steam for power and processing purposes, and the returns from the investment have paid as high as 100 per cent per annum. Manufacturers who see a possible application of the principle in their plants will find it worth while to make an investigation of this opportunity for economy.

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Manufacture and Composition of Chocolate Products

By Frank C. Gephart
Consulting Chemist, New York City

IN THE MANUFACTURE of chocolate products sound cacao beans of good quality, free from mould and properly fermented, are first subjected to cleaning to remove imperfectly formed beans, bits of sand, dirt, metallic substances, and other foreign matter. This is usually accomplished with specially constructed machines employing screening operations as well as fans and magnets. It is necessary to remove these materials before roasting and milling, as a much cleaner and finer finished product is thus produced. Imperfectly formed beans, if not sorted out, do not lend themselves easily to hull removal, hence their presence in the roast might increase the shell content of the clean nibs and thereby reduce the quality of the manufactured product. Stones, coins, nails, and the like must be removed to prevent damage to milling machinery.

Courtesy of Jabez Burns & Son, Inc., and Runkel Bros., New York City.

Cocoa bean cleaner

The sound beans thus cleaned are ready for roasting. This operation is conducted in specially constructed rotary roasters employing either direct heat, gas, steam, or oil. The most modern type of roaster uses forced draft with gas as a fuel, adequately ventilated, and provided with insulation to prevent undue loss of heat. The charge ranges from 400 to 600 lb. The temperature employed is from 100 to 135 deg. C. Roasting is considered complete when the beans are free from "vinegar" odor. Each variety of bean requires individual roasting to bring out its best qualities, hence cocoa beans are blended after roasting; seldom before. As soon as the roasting is completed the charge from the roaster is dumped into specially constructed exhaust coolers where it is rapidly cooled to prevent over-roasting from its self-contained heat. When thoroughly cooled the roasted beans are automatically fed through a cracker and cleaner, where the shell is removed and the cracked nibs are separated.

Roasting and Blending Determine Quality

Roasting performs two important functions: it renders the shell more friable, and hence easily removable; it develops the flavor and aroma of the chocolate. Roasting is an extremely important operation in the manufacture of chocolate, equally important to the quality of the product as is the cooking of palatable food.

The roasted and cleaned nibs are now ready for blending. Blending in cocoa performs the same function as it does in tea and coffee. Certain varieties possess pronounced "body" qualities, others are known for their flavor quality, still others for their color quality. By skillfull blending a well rounded product is obtained. After blending, the nibs are next ground in chocolate mills, to produce liquor—the base from which are made all chocolate preparations. Grinding is usually performed in steel-encased, stone burr mills in units of three, which are known in the trade as "triple mills," one superimposed upon the other. The heat generated in grinding is sufficient to melt the liquor; hence it flows from the mills as a thick paste possessing the rich, agreeable odor and taste of chocolate. Chocolate is sometimes ground in disc mills, a well-known type being the Bausman Disc. This is a steel disc mill and for quantity production is superior to the triple mill. It is sometimes used in conjunction with the triple mill. One of its features is that materials, such as sugar, may be incorporated at the time of grinding rather than in a later operation. Another form of combined mill and mixer is the Bramley machine. This machine takes a charge of roasted nibs, sugar, and other materials, and produces

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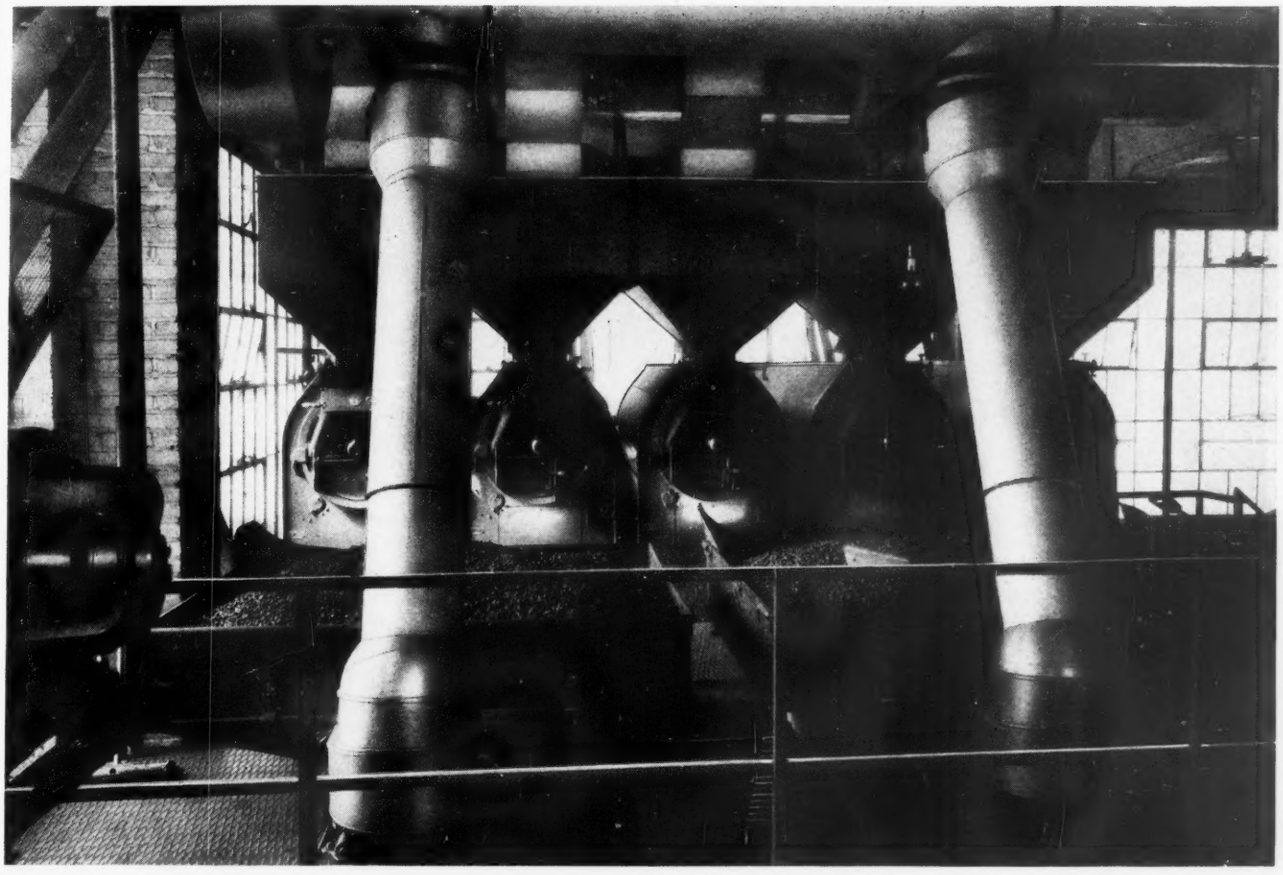


Courtesy of Jabez Burns & Son, Inc., and Runkel Bros., New York City.

Front view of cocoa roasters in operation

a finished product without a transfer to other machinery. Its feature of preparing a finished product in one piece of equipment is appealing, and it is finding an increased application in the manufacture of chocolate.

With the production of chocolate liquor, we have reached a parting of the ways. If cocoa powder and cocoa butter are desired the chocolate liquor is pumped into hydraulic presses and subjected to pressure; cocoa butter issues from the press as such, and the remaining press cake is ground and bolted to form the cocoa powder of commerce. The fat content of the cocoa powder may be regulated by the pressure exerted in the press, the time of pressing, and the temperature. If close regulation is required it should be controlled by the analysis of the liquor before introduction into the press, together with weight control of the butter produced and analysis of the resultant powder. Extremely close regulation can be effected in this manner. The question is important in the preparation of breakfast cocoa which must contain 22 per cent of fat to bear such a label declaration. It is equally important to the manufacturer of commercial cocoa and cocoa butter, as cocoa butter is the most expensive ingredient of chocolate.

If Dutch Process cocoa is desired, alkalization must be done; before roasting, after roasting, or by treatment of the liquor itself. Originally alkali was added only in sufficient quantity to neutralize the free acidity of the bean, but today it is not so carefully controlled in most plants. The alkalies used are potash, soda, ammonia, or magnesia. "Dutching" changes the color of the product when made up in cup, often in the powder itself. It does not render the product more soluble although

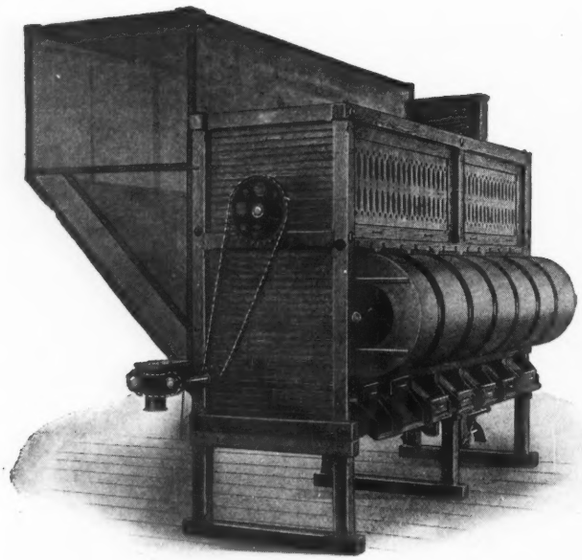
ANALYSES OF COCOA BEANS

Shell (Hand Separated) Per Cent	Fat Per Cent	Free Fatty Acid Per Cent of Fat	Variety
u 10.9	43.15	....	Accra
u 12.1	44.10	....	Accra
u 10.6	45.60	....	.....
u 10.6	46.78	....	Accra
u 10.1	45.50	....	Accra
u 9.2	46.77	....	.....
u 9.8	47.15	....	.....
u 12.5	46.60	....	Accra
u 14.2	45.80	....	Trinidad
u 14.4	45.90	....	.....
u 10.0	46.35	m 2.87	.....
R	44.90	....	Sanchez
R	45.80	....	Bahia
u 10.0	47.50	m 2.60	.....
R	48.00	....	Lagos
u	44.32	....	Costa Rican
u	43.53	....	Bahia
u	45.22	....	Accra

u Unroasted.
R Roasted.
m Moldy.

TYPICAL ANALYSES OF CHOCOLATE LIQUORS

						—Dry-Fat-Free Basis—		
Moisture, Per Cent	Fat, Per Cent	Crude Fiber, Per Cent	Total Ash, Per Cent	Acid Insoluable Ash, Per Cent	Crude Fiber, Per Cent	Total Ash, Per Cent	Acid Insoluable Ash, Per Cent
1.43	54.18	2.90	3.49	0.15	6.54	7.86	0.34
2.26	53.07	2.67	3.35	0.10	5.98	7.50	0.22
1.91	51.88	3.09	3.25	0.15	6.70	7.04	0.31
0.91	55.23	3.15	2.74	0.05	7.18	6.24	0.11
0.69	52.78	3.30	3.31	0.05	7.08	7.10	0.11
0.92	53.44	3.22	3.27	0.08	7.05	7.16	0.18
1.24	53.31	3.73	3.56	0.09	8.21	7.84	0.20
....	51.71	....	....	....	....	....	....
....	53.02	....	....	....	....	....	....
....	53.61	....	....	....	....	....	....
....	53.58	....	....	....	....	....	....
....	51.65	....	....	....	....	....	....
0.99	54.43	....	....	....	....	....	....
....	53.24	....	....	....	....	....	....
....	51.75	....	....	....	....	....	....
....	53.88	....	....	....	....	....	....
....	53.28	....	....	....	....	....	....
....	53.96	....	....	....	....	....	....



Courtesy, National Equipment Co., Springfield, Mass.

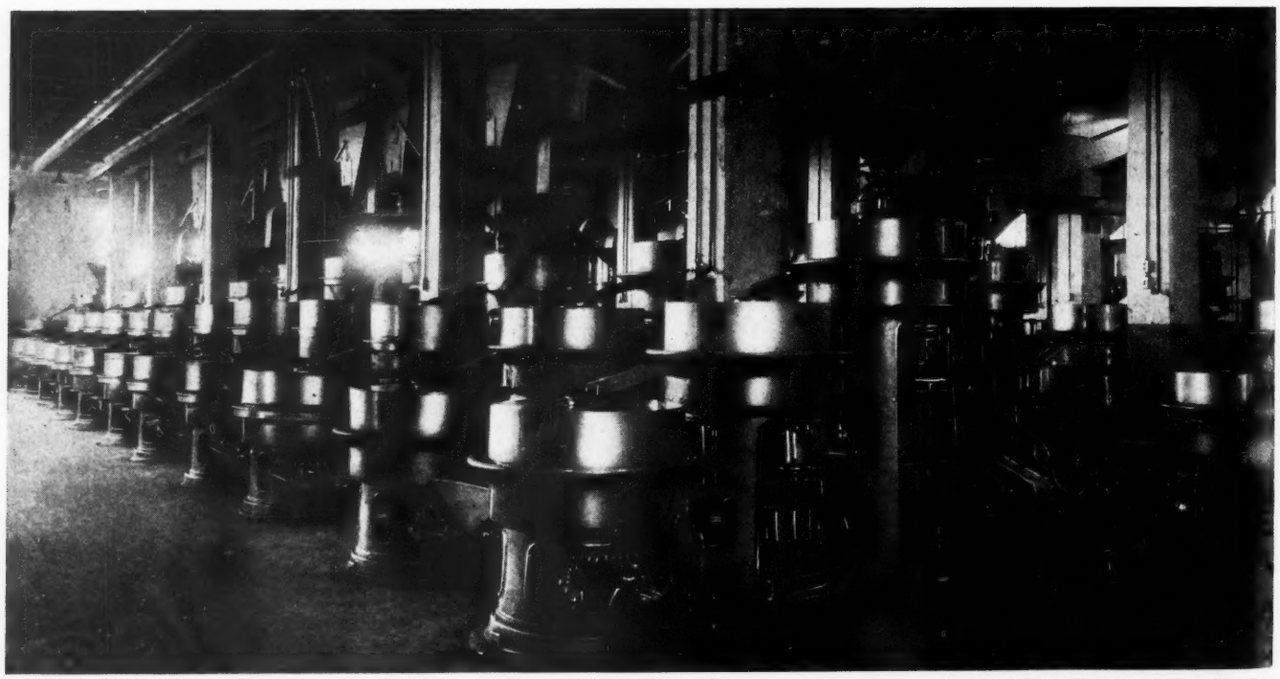
Cracker and fanner

"dutched" cocoas hold themselves more in suspension and hence deposit less sediment in the cup. The action of alkali effects an alteration in the protein of the cocoa and usually imparts an "alkali odor," requiring bouqueting of the finished product.

Cocoa butter possesses high rancidity-resisting properties and is used in the preparation of sweet chocolate, chocolate covers, milk chocolate, and similar products, to the extent of 15 to 20 per cent.

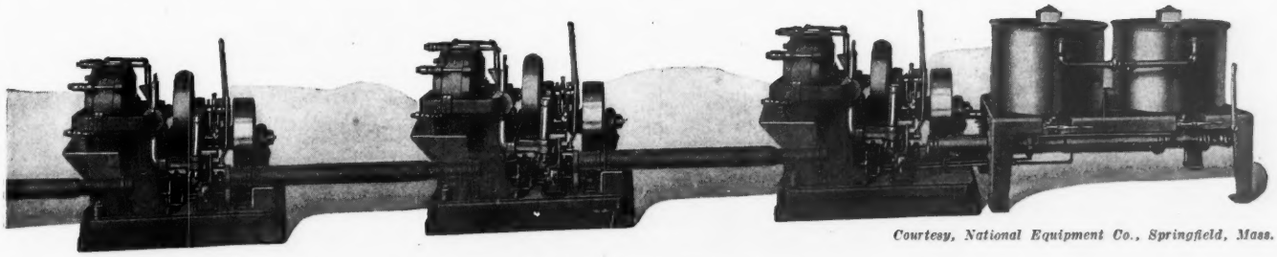
Sweet chocolate, milk chocolate, chocolate bars, and the like, are all made from chocolate liquor as a base, with which is incorporated sugar, milk, nuts, and other foods. Sweet chocolate and chocolate cover contain from 40 to 65 per cent sugar, 10 to 30 per cent of added cocoa butter and the remainder chocolate liquor. Bitter chocolate contains from 5 to 20 per cent of sugar, about 15 per cent added cocoa butter, the remainder being chocolate liquor. Milk chocolate contains about 12 per cent of whole milk solids, 35 to 50 per cent of sugar, 15 to 40 per cent of added cocoa butter, the remainder being chocolate liquor. Chocolate bars are made by the incorporation of nuts, or other foods, into the foregoing products. Sugar, milk, and other items are incorporated in the chocolate liquor through the use of refiners of various kinds. In some classes of products steel rollers are used, followed by treatment in melangeurs and conches. In others the steel roller operation is omitted. The object of refining is to render the product smooth and free from grittiness; as well as to impart flavor, gloss, and snap. Refining is continued until the desired result is obtained. Milk chocolate may be made by three distinct types of processes; by the use of fresh whole milk, whole milk powder, or a mixture of skim milk powder and pure butter fat. As long as the constituents of milk solids are present in the proportions found in whole milk, the requirements of the law are satisfied. When whole milk is used the mass is concentrated in special vacuum evaporators until the moisture is eliminated. When whole milk powder or the mixture of skim milk powder and butter fat is used, they are incorporated by the use of roll refiners followed by the melanguers and conches. When refining has proceded to the desired stage, the chocolate mass is tempered and molded. The temperature of molding varies with the product, but is usually between 32 and 34 deg. C. Chocolate bars are molded in metallic molds, subjected to shaking before solidification, to remove air bubbles, and finally cooled in chilled ventilated tunnels. Wrapping and packaging is done by automatic machinery. Covering chocolate is usually placed in cold storage as some improvement in texture and flavor follows such treatment.

As already stated and as indicated by reference to the various tables, the composition of chocolate preparations varies within relatively wide limits. This condition is due to individual manufacturing preference and a desire on the part of the manufacturer to provide products that meet the requirements of the trade. Regardless of the



Courtesy, Hershey Chocolate Co., Hershey, Pa.

Battery of triple mills



Courtesy, National Equipment Co., Springfield, Mass.

Battery of Bausman discs

variations in the composition of these products, they are all manufactured to meet the requirements of the standards for cacao products adopted by the United States Department of Agriculture. These definitions and standards were promulgated by the Food, Drug, and Insecticide Administration of the United States Department of Agriculture after intensive study by the Department with the co-operation of the chocolate trade, and are designed to meet the average manufacturing conditions existing at the time. The trade has heartily co-operated with the government in the formulation of these standards and many benefits have resulted therefrom. Revisions are made from time to time as our knowledge of the chemistry of chocolate increases, and as manufacturing improvements warrant. The present definitions and standards are as follows:

1. Cacao beans, cocoa beans, are the seeds of trees belonging to the genus *Theobroma,* especially those of *Theobroma cacao L.,* and closely related species.

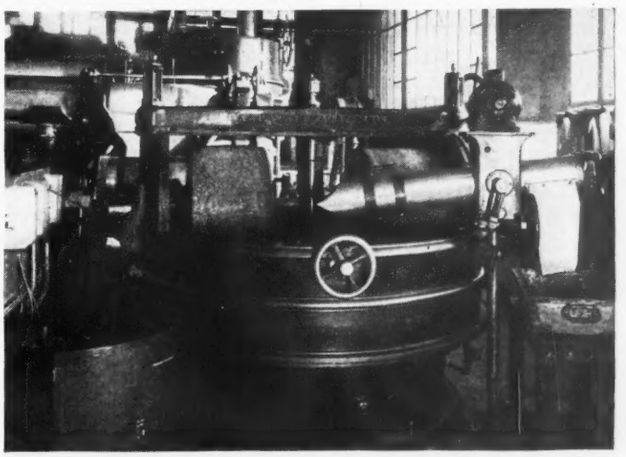
2. Cacao nibs, cocoa nibs, "cracked cocoa," are roasted or dried cacao beans, broken and freed from germ and from shell or husk.

3. Chocolate, plain chocolate, bitter chocolate, chocolate liquor, chocolate paste, bitter chocolate coating is the solid or plastic mass obtained by grinding cacao nibs, and contains not less than 50 per cent of cacao fat and, on the moisture- and fat-free basis, not more than 8 per cent of total ash, not more than 0.4 per cent of ash insoluble in hydrochloric acid, and not more than 7 per cent of crude fiber.

4. Sweet chocolate, sweet chocolate coating, is chocolate mixed with sugar (sucrose) with or without the addition of cacao butter, spices, or other flavoring materials, and contains, on the moisture-, sugar-, and fat-free basis, no greater percentage of total ash, ash insoluble in hydrochloric acid, or crude fiber, respectively, than is found in moisture- and fat-free chocolate.

5. Milk chocolate, sweet milk chocolate, is the product obtained by grinding chocolate with sugar, with the solids of whole milk, or the constituents of milk solids in proportions normal for whole milk, and with or without cacao butter and/or flavoring material. It contains not less than 12 per cent of milk solids.

6. Cocoa, powdered cocoa, is chocolate deprived of a



Courtesy, Baker Perkins Co., Inc., Saginaw, Mich., and New York City

Automatic discharging melangeur able to handle 300 lb. of chocolate in less than a minute

TYPICAL ANALYSES OF CHOCOLATE COATINGS

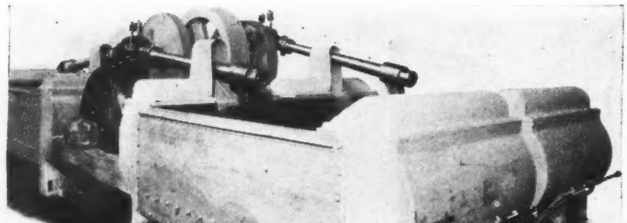
Moisture,, Per Cent	Total Fat, Per Cent	Sugar, Per Cent	Cacao Matter Dry-Fat-Free, Per Cent	Chocolate Liquor Containing 55 Per Cent Fat	Added Cocoa Butter, Per Cent	Total Ash, Per Cent	Acid Insoluble Ash, Per Cent	Crude Fibre, Per Cent	Dry-Fat-Sugar-Free Basis: Total Ash, Per Cent	Dry-Fat-Sugar-Free Basis: Acid Insoluble Ash, Per Cent	Dry-Fat-Sugar-Free Basis: Crude Fiber Per Cent
1.88	38.50	39.96	19.66	43.70	14.46	....	....	....	....	....	....
0.72	36.14	47.71	15.43	34.29	17.28	....	....	....	....	....	....
0.54	33.33	53.56	12.57	27.93	17.97	....	....	....	....	....	....
0.73	34.40	50.29	14.58	32.40	16.58	....	....	....	....	....	....
0.73	34.00	49.81	15.46	32.13	17.33	....	....	....	....	....	....
0.35	35.92	43.16	20.57	45.71	10.78	1.35	0.04	1.46	6.56	0.19	7.10
1.80	35.02	47.57	15.61	34.69	15.94	....	....	....	....	....	....
0.51	35.14	61.05	3.30	7.33	31.11	....	....	....	....	....	....
0.87	34.58	49.86	14.69	32.70	16.57	1.01	0.06	0.96	6.89	0.41	6.45
0.90	37.98	44.75	16.47	35.21	19.14	1.45	0.03	1.48	*8.79	0.18	8.97
0.49	36.83	42.38	20.30	36.89	20.24	1.56	0.03	1.54	*7.69	0.13	7.59
0.80	37.86	44.73	16.61	30.19	24.28	1.41	0.03	1.34	*8.49	0.20	8.07
0.80	37.85	43.41	17.94	32.60	23.19	1.52	0.03	1.36	*8.47	0.16	7.58
1.23	35.36	42.93	20.48	37.23	18.61	1.74	0.04	1.54	*8.51	0.21	7.52
1.32	35.26	43.80	19.62	43.60	11.28	1.83	....	....	*9.33	....	....
1.25	34.71	45.40	18.64	41.42	11.93	1.40	....	....	7.51	....	....
0.57	32.15	61.70	5.58	12.40	25.33	....	....	....	....	....	....
0.44	28.85	65.22	5.49	9.98	24.36	....	....	....	....	.....	....

*Dutched?

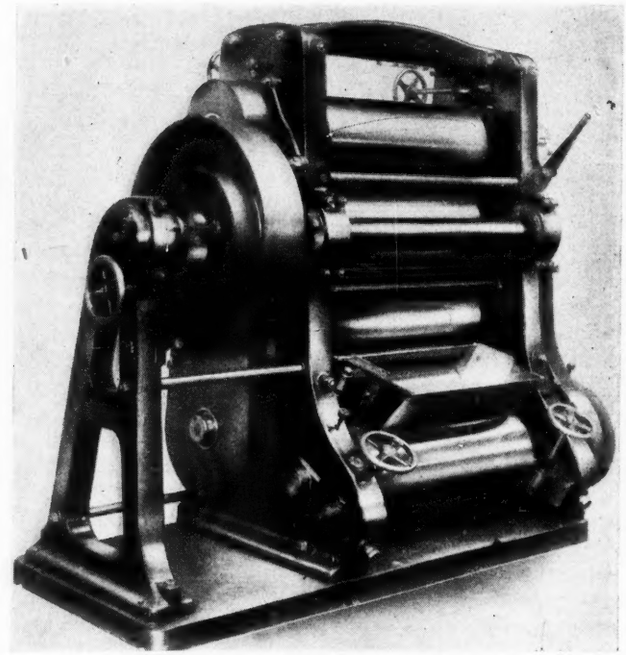
TYPICAL ANALYSES OF MILK CHOCOLATE

Moisture, Per Cent	Sucrose, Per Cent	Lactose, Per Cent	Total Fat, Per Cent	Reichert-Meissl No.	Butter Fat, Per Cent	Casein, Per Cent	Total Milk Proteins (Casein x 1.25), Per Cent	Total Milk Solids (5 Per Cent Salts), Per Cent	Cacao Mass, Per Cent	Chocolate Liquor Contains (55 Per Cent Fat), Per Cent	Added Cocoa Butter, Per Cent
1.33	50.02	4.72	34.00	3.08	3.73	2.30	2.88	11.93	6.45	14.33	22.39
*1.38	34.27	1.95	50.49	0.58	0.00	1.40	1.75	3.89	9.97	22.15	38.31
1.30	54.20	3.84	31.66	3.64	4.23	2.36	2.95	11.57	5.50	12.22	20.71
1.06	41.94	7.05	36.50	5.46	7.70	5.56	6.95	22.78	5.42	12.04	22.18
0.45	49.20	3.29	34.46	4.03	5.16	2.41	3.01	12.06	8.99	19.98	18.31
0.88	51.20	4.96	31.71	2.92	3.27	2.92	3.65	12.51	6.97	15.49	19.92
0.95	46.40	4.29	36.64	2.57	3.23	2.17	2.71	10.74	8.50	18.91	23.00
0.39	49.74	6.04	32.94	4.51	5.62	5.07	6.34	19.03	3.52	7.82	23.02

*Skim milk.



Courtesy, Baker Perkins Co., Saginaw, Mich., and New York City
"Roundtree-Baker" Conche Machine No. 12, capable of working a charge of three tons



Courtesy, Baker Perkins Co., Saginaw, Mich., and New York City
Five-roll refiner, type 2CA, provided with water circulation and patented scraper

portion of its fat and pulverized, and contains, on the moisture- and fat-free basis, no greater percentage of total ash, ash insoluble in hydrochloric acid, or crude fiber, respectively, than is found in moisture- and fat-free chocolate.

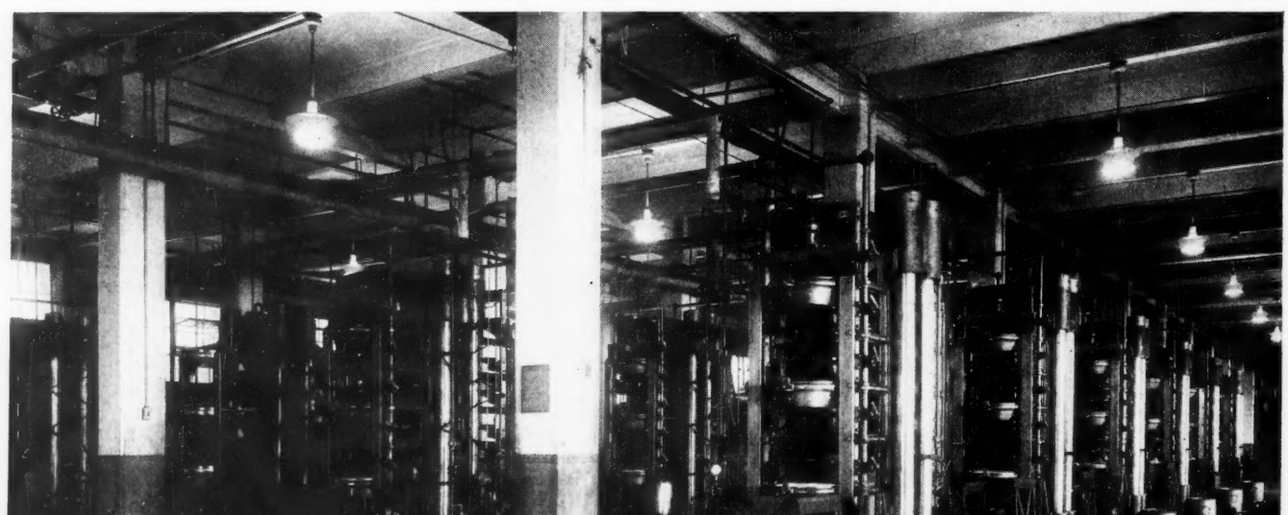
7. "Breakfast cocoa" is cocoa which contains not less than 22 per cent of cacao fat.

8. Sweet cocoa, sweetened cocoa, is cocoa mixed with sugar (sucrose), and contains not more than 65 per cent of sugar in the finished product, and, on the moisture-, sugar-, and fat-free basis, no greater percentage of total ash, ash insoluble in hydrochloric acid, or crude fiber, respectively, than is found in moisture- and fat-free chocolate.

9. Sweet milk cocoa is the product obtained by grinding cocoa with sugar, with the solids of whole milk, or the constituents of milk solids in proportions normal for whole milk, and with or without flavoring material. It contains not less than 12 per cent of milk solids.

10. Dutch-process chocolate, "alkalized chocolate," and Dutch-process cocoa, "alkalized cocoa," are modifications, respectively, of chocolate and cocoa, in that in their manufacture an alkali carbonate, or other suitable alkaline substance, has been employed. In the preparation of these products not more than 3 parts by weight of potassium carbonate, or the neutralizing equivalent thereof in other alkaline substance, are added to each 100 parts by weight of cacao nibs. The finished products conform to the standards for chocolate and cocoa, respectively, due allowance being made for the kind and amount of alkaline substance added.

It will be noted in judging the purity of the chocolate product under these standards, that the findings are



Courtesy, Hershey Chocolate Co., Hershey, Pa.
Battery of Carver cocoa presses

TYPICAL ANALYSES OF COCOA POWDERS AND COCOA PRESS CAKE

Moisture, Per Cent	Total Fat, Per Cent	Total Ash, Per Cent	Acid Insoluble Ash, Per Cent	Crude Fiber, Per Cent	Alkalinity Water Sol. Ash	Dry-Fat-Free Basis				
						Total Ash, Per Cent	Acid Ins. Ash, Per Cent	Crude Fiber, Per Cent	Na_2O, Per Cent	K_2O, Per Cent
3.86	16.73	....	....	....	....	....	....	....	....	....
*3.21	†25.14	....	0.15	4.35	3.54	....	0.20	6.07	....	....
*4.70	†23.24	....	0.16	4.99	8.04	....	0.22	6.92	2.29	1.58
*5.68	†25.06	....	0.15	4.65	5.80	....	0.22	6.71	1.84	1.85
4.13	†22.92	....	....	....	....	....	....	....	....	....
3.71	21.07	....	....	4.46	....	....	....	5.93	....	....
3.47	20.73	....	....	....	....	....	....	....	....	....
3.74	19.62	....	....	....	....	....	....	....	....	....
4.52	18.70	....	....	....	....	....	....	....	....	....
2.92	20.21	....	....	5.78	....	....	....	7.52	....	....
5.18	10.96	....	....	....	....	....	....	....	....	....
*2.46	22.54	5.52	0.26	4.57	....	7.36	0.35	6.09	....	....
2.77	21.72	....	....	5.17	....	....	....	6.88	....	....
*5.46	21.39	7.52	....	....	5.50	10.25	....	....	....	4.05
1.36	†23.28	5.38	0.23	4.21	....	7.14	0.31	5.59	....	....
2.32	†23.25	....	....	4.82	....	....	....	6.47	....	....
2.00	21.91	5.29	0.12	4.85	....	6.95	0.16	6.95	....	....
5.63	†22.89	....	....	....	....	....	....	....	....	....
1.57	†22.24	....	....	....	....	....	....	....	....	....
6.14	17.99	5.93	0.43	6.06	....	7.82	0.57	7.98	....	....
5.83	20.24	5.25	0.21	5.35	....	7.10	0.28	7.24	....	....
*3.52	21.47	9.03	0.02	6.32	9.78	12.04	0.03	8.43	1.83	2.76
5.44	13.44	5.77	0.18	5.33	....	7.11	0.22	6.57	....	....
0.36	†23.66	5.14	0.14	4.78	....	6.76	0.18	6.29	....	....
3.35	†24.58	5.18	0.23	4.51	....	7.18	0.32	6.25	....	....
1.89	†22.87	5.11	0.16	4.90	....	6.79	0.21	6.51	....	....
3.16	†26.39	4.67	0.24	4.51	....	6.62	0.34	6.40	....	....
2.61	†22.18	....	....	4.92	....	....	....	6.54	....	....
3.97	18.49	5.46	0.20	5.25	....	7.04	0.26	6.77	....	....
....	8.25	....	....	....	....	....	....	....	....	....
....	8.04	....	....	....	....	....	....	....	....	....
....	8.39	....	....	....	....	....	....	....	....	....
....	14.79	....	....	....	....	....	....	....	....	....
....	14.54	....	....	....	....	....	....	....	....	....
....	†23.93	....	....	....	....	....	....	....	....	....
....	21.46	....	....	....	....	....	....	....	....	....
....	†22.19	....	....	....	....	....	....	....	....	....
....	21.92	....	....	....	....	....	....	....	....	....
....	†22.49	....	....	....	....	....	....	....	....	....
*3.82	20.62	8.47	....	....	13.00	....	....	....	....	....
*....	20.11	13.93	....	....	17.98	....	....	....	....	....
....	14.16	....	....	....	....	....	....	....	....	....
....	11.72	....	....	....	....	....	....	....	....	....
....	13.07	....	....	....	....	....	....	....	....	....
....	11.05	....	....	....	....	....	....	....	....	....
....	14.90	....	....	....	....	....	....	....	....	....
....	12.03	....	....	....	....	....	....	....	....	....
....	15.86	....	....	....	....	....	....	....	....	....

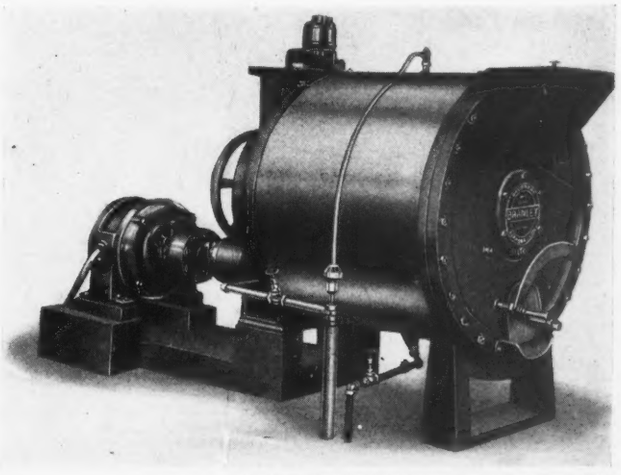
*Dutched Cocoa. †Breakfast Cocoa.

always reverted back to the dry-fat-free cacao matter contained in the preparation. In other words, in order to meet the requirements of these standards the chocolate contained in the preparation must comply with the standards of chocolate liquor; this permits products of widely varying composition and at the same time safeguards their purity.

Technical Progress in the Industry

Great progress has been made in recent years in the development of chocolate machinery. New ideas of manufacture are constantly being put forth in the form of new machinery, new methods of manufacture are being introduced and many of the leading plants are constantly working upon new methods for cost reduction in the handling of their products in the intermediate stages of their manufacture. At least one large machinery manufacturer has a competent chemist on its staff and chemical laboratories are gradually finding their place in the service of this industry. The wide appreciation of technical service, however, and the fullest utilization of technical knowledge has not generally been made. This condition is not surprising because the industry has hit its stride only during the last fifteen years, and I venture the prediction that within the next ten years every chocolate plant of consequence will be found making the fullest use of technical knowledge. It frequently happens that both machinery and methods used in one industry may be advantageously used in another industry. An understanding of the fundamental principles involved and a keen insight into individual needs and problems in a great variety of industries, permits one so informed to make such adaptations advantageously.

The average chocolate manufacturer knows how to buy, manufacture, and sell; he attaches more importance to the economics of buying and selling than he does to the economics of manufacturing. If he buys and sells shrewdly he shows a profit, but he could show a much greater profit if he also manufactured shrewdly. Let me take for an example the manufacture of so-called breakfast cocoas. The definitions and standards for this product specify that it shall contain at least 22 per cent of cocoa butter to bear the label declaration of breakfast cocoa. Of 308 samples of this product recently examined in the author's laboratory, some of which were repeat samples from the same manufacturer, 287, or 93 per cent of the total, contained over 22 per cent of cocoa butter. This may indicate a desire on the part of the manufacturer to comply with the law, but it is also proof that he is unnecessarily giving away tons of cocoa butter worth 30 cents per pound, and manufacturing a product



Courtesy, Bramley Machinery Corp., New York City.

Bramley machine for the manufacture of chocolate in one operation

TYPICAL ANALYSES OF COCOA BUTTER

Color	Odor	Taste	Fracture	Specific Gravity at 25 Deg. C.	Melting Point Deg. C.	Solidification Point Deg. C.	Iodine No. (Hanus)	Saponification No.	Free Fatty Acids as Oleic Acid, Per Cent	Bjorklund's Ether Test	Rancidity Kreis
Gy. Yel.	Choc.	Choc.	Conchoidal	0.965	32.5	21.7	35.4	194.4	1.37	Neg.	Neg.
Lt. Yel.	Choc.	Choc.	Granular	*0.903	32.1	24.3	36.0	189.7	0.65	Neg.	Neg.
Pale Yel.	Mild	Bland	Granular	*0.894	31.8	24.1	37.5	190.0	0.95	Neg.	Neg.
Yel.	Mild	Bland	Conchoidal	*0.903	31.9	24.2	36.5	188.9	0.97	Neg.	Neg.
Yel.	Mild	Choc.	Conchoidal	0.900	32.7	23.0	35.4	193.8	0.91	Neg.	Neg.
Lt. Yel.	Choc.	Choc.	Conchoidal	0.967	32.0	18.8	37.5	192.4	1.56	Neg.	Neg.
Yel.	Choc.	Choc.	Granular	0.973	32.3	19.5	37.7	192.6	1.24	Neg.	Neg.
Lt. Yel.	Choc.	Choc.	Conchoidal	0.979	33.2	21.2	35.2	193.5	0.98	Neg.	Neg.
Gy. Yel.	Choc.	Choc.	Conchoidal	0.963	32.5	21.7	35.4	194.5	3.50	Neg.	Neg.
Yel.	Str. Choc.	Str. Choc.	Conchoidal	0.963	32.5	21.4	35.6	195.4	2.09	Neg.	Neg.
Yel.	Str. Choc.	Str. Choc.	Cohchoidal	0.963	32.6	21.5	36.1	195.0	1.67	Neg.	Neg.
Yel.	Choc.	Choc.	Conchoidal	0.961	32.4	22.2	37.8	194.4	1.49	Neg.	Neg.
Lt. Yel.	Mild	Mild	Granular	0.961	32.4	21.6	36.9	193.3	1.07	Neg.	Neg.
Lt. Yel.	Choc.	Mild	Conchoidal	0.964	32.4	21.6	36.0	194.7	2.26	Neg.	Neg.
Lt. Yel.	Mild	Mild	Conchoidal	0.964	32.6	19.5	39.3	192.3	0.98	Neg.	Neg.
Lt. Yel.	Mild	Choc.	Granular	*0.894	32.4	23.3	36.5	193.5	0.77	Neg.	Neg.
Yel.	Mild	Choc.	Conchoidal	*0.895	31.7	22.1	37.1	190.0	0.99	Neg.	Neg.
Yel.	Mild	Bland	Conchoidal	*0.895	31.8	22.2	34.0	195.3	1.17	Neg.	Neg.
Yel.	Mild	Choc.	Granular	*0.894	32.6	24.7	35.2	192.9	0.62	Neg.	Neg.

*@ 40 Deg. C./20 Deg. C. Others @ 25 Deg. C./25 Deg. C.

which he does not know how to control. Perhaps this supplies some manufacturers with the answer to underbidding by wide-awake competitors. In a great majority of cases there is only one answer and that is—absence of control. Cocoa presses are not difficult to operate but the operators of cocoa presses, like other employed individuals not provided with methods of control, always play it safe and do not place their employment in jeopardy. An occasional analysis of cocoa powder or cocoa cake only indicates the condition existing at the time the sample was taken, and even then has very little significance unless the sample was properly taken. The manufacturer, therefore, unknowingly bears the brunt of the situation and is happy if he continues to sell his

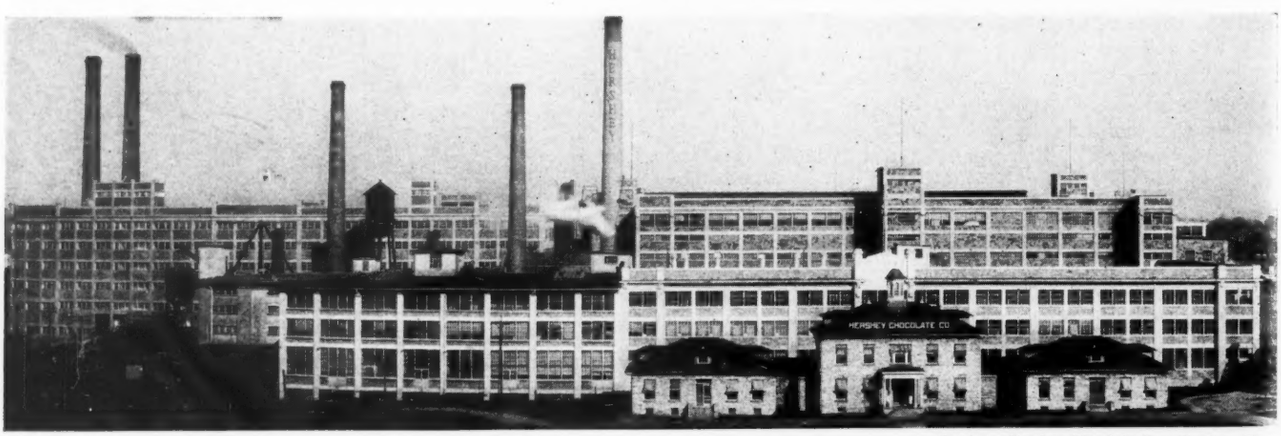
The author's research laboratory, especially equipped for cocoa and chocolate research

product, and unhappy when a competitor steps in and takes away his contract. Frequently I am called upon, by unsuccessful bidders, to examine breakfast cocoas that have been shipped in fulfillment of contracts, and only in the rarest of instances have I found adulteration. The answer has invariably been that the successful product showed a lower cocoa butter content, yet within the contract specifications.

I have cited the example of breakfast cocoa because it is an arbitrary standard, a mark for the manufacturer to shoot at, and the proofs submitted prove that he is a poor marksman. The same conditions apply in the manufacture of low-fat cocoas, where even greater economies can be effected by the application of control. With the constant increasing consumption of low-fat cocoa this becomes an extremely important matter, and is likely to be of even greater importance in the future.

It would be a simple matter to cite numerous instances in a variety of products where great financial damage has resulted from lack of control in their manufacture, buyer-seller disputes resulting in rebates and penalties and often in loss of contracts. It is possible, at a nominal cost, to standardize the manufacture of these products in a sound, scientific, and business-like manner.

There are some progressive manufacturers who are thoroughly conversant with these facts, and have provided means of avoiding these business pitfalls, yet their numbers are too few and the experiences which they have gained should be examples to those who are striving to gain leadership. When chemistry is applied industrially in virgin fields, a business organization in which this application is made takes on a new lease on life. Manufacturing processes are standardized, manufacturing costs are accurately ascertained, wasteful handling of materials is eliminated, employees are keen to sense the importance of strict adherence to their instructions, basic facts hitherto unknown in the business are unearthed and a feeling of security is passed on to the trade. All of this is reflected in the balance sheet of the organization. Chemistry, however, is only a tool with which to work. Its successful use requires skillful application, coupled with a broad understanding of the problems at hand and their comparative scale of importance.



Courtesy, Hershey Chocolate Co., Hershey, Pa.

A modern, up-to-date chocolate plant

MODERN PROCESSING REVIVES A LONG-DORMANT INDUSTRY

Sorghum Syrup Now Made Successfully Under Strict Technical Control

By J. J. WILLAMAN
University of Minnesota

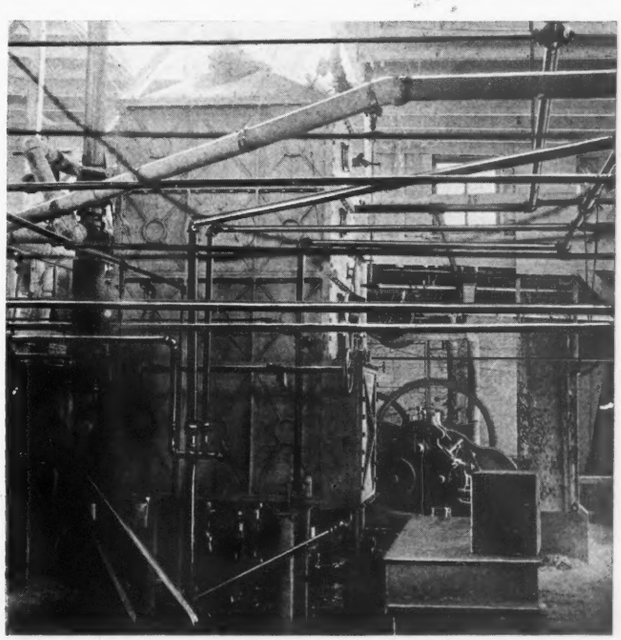
THIS epitomizes the romance of modern industry. For full comparative effect one should contrast with it the sorghum mill as most of us know it. There, the leaves are removed by hand, or put through the rolls with the stalks. Usually there are in a single unit no more than two or three rolls, turned by a mule sweep, or possibly by a belt from a tractor. The juice is strained through a bed of straw. Sometimes it is slightly limed; usually not. It is boiled down in a pan or kettle over a direct fire, in rare cases by steam coils. If the operator is skillful or lucky it doesn't scorch. Green sediment and coagulum removed by filtration are boiled with the juice. The operator attempts to remove it by skimming, with partial success and considerable waste. His judgment tells him when the juice becomes a syrup. The resultant product may be of very high quality; usually it is of very low quality. In any event, the outcome is largely fortuitous. Flies lie in wait for sorghum-boiling time and their patience is well rewarded. The seed is left on the ground to dry and what the birds don't get is then hung under the roof of the shed. From beginning to end, this type of syrup making is wasteful of material, profligate of labor, uncertain of results.

The horse-sweep sorghum mill is being succeeded by the up-to-date, scientifically controlled sorghum working establishment, in which syrup is only one of the products. This is well exemplified by the Cedar Rapids, Iowa, plant of the Waconia Sorghum Mills. It has just completed its third season and has worked with a smoothness and efficiency that was eminently satisfactory to its designers. About 20,000 tons of sorghum cane flowed through the factory, untouched by human labor, and appearing at four different places in the plant in as many different products—syrup from the juice, ground feed from the leaves, seed from the panicles, and electrical energy from the bagasse. In fact, it is difficult to decide which is the product and which the byproducts; they are all given equally careful attention in order to ensure standard and uniform quality. It is a repetition of the history of so many other industries; the utilization of all materials entering the factory makes the industry succeed where otherwise it could not.

But lest we convey the idea that this plant is typical of present-day sorghum syrup manufacture it should be mentioned that the great bulk of this product is still made in the small, crude way in which it has always been made. This country produces about 30 million gallons of the syrup annually, most of it below the Mason and Dixon line. Of this not more than 3 per cent is made in what may be called industralized factories, and only about 1.5 per cent in technically controlled, efficient plants such as the one here described. It is difficult to see how the farm manufacture of the syrup can be profitable; probably if the farmer maker kept accounts he would cease to think so. Another great difference between the two processes lies in the quality and uniformity of the product.

Thus, the Cedar Rapids plant is unique in the industry. There are four buildings, made wholly of steel and concrete. They are completely electrified, current being supplied by a generator in the plant. Two boilers, burning bagasse and oil, supply steam for the generator and the driers. Each machine is individually motorized, which gives many advantages in simplicity of operation, independent stopping and starting, distant control, and variable speed. Mechanical conveyance and packaging is, of course, utilized throughout.

A visit to the plant usually does not begin where the cane begins its mechanized journey. This might more properly take place in April in the fields. The company contracts with the farmers for about half of its cane. The other half it grows itself, on fields ranging in size



Sorghum syrup evaporator

from 100 to 400 acres. Here our erstwhile co-laborer, the horse, has no place. Tractors pull the plows, discs, harrows, seeders, and cultivators throughout the growing season, special hook-ups having been devised for these particular needs. At harvest time the whole cane, just as it stands, is cut with corn binders adapted to handle this tall crop. A tractor pulls the binder, sometimes two of them. Automobile lamps on the tractor enable the cutting to proceed night and day. The bundles of cane are taken to the mill on special low wagons hauled by tractors. Compare with this the other way of doing it—cutting off the seed heads by hand, knocking off the leaves with sticks, cutting and tieing the cane by hand.

The cane may be fed directly into the mill, or it may be shocked for a time in the field or in the yard of the factory. Loading the cane on the wagons, shocking, and placing the bundles on the feed tables are the only hand operations performed on the cane. It is quite possible that some of these may succumb to mechanical processes before long. As the cane moves up the feed table the heads are cut off, they being conveyed to the head drier where we shall meet them later. The cane proceeds to a cleaning machine, where the leaves and stalks are separated. The leaves are conveyed to their drier, and the cane to the crushers. The latter is an all-steel, 8-roll, hydraulically regulated mill, with maceration between the second and third units. The cane receives a thorough crushing and grinding, the resultant bagasse being in excellent condition for combustion in the furnaces, to which it is conveyed continuously. The make-up fuel is oil or coal.

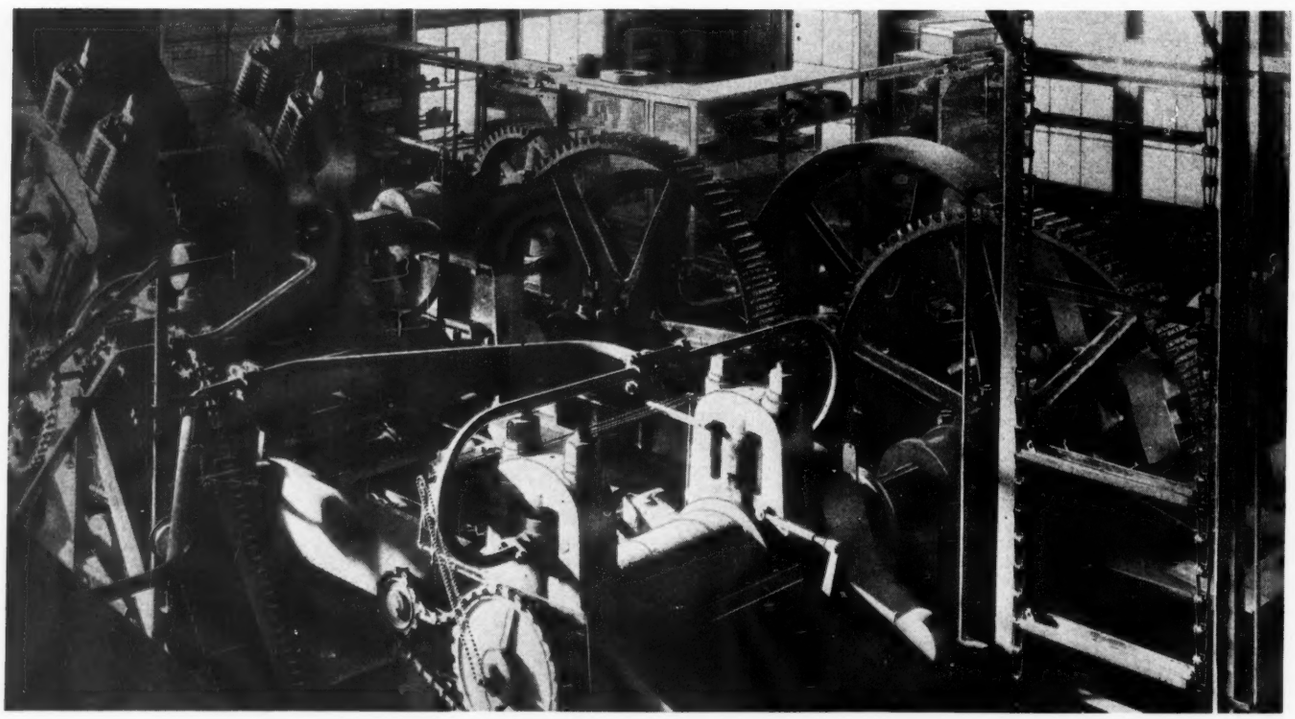
Juice from the mills is pumped to treatment tanks, where it is carefully treated to reduce the acidity to the desired point and heated to boiling. At this stage the color, clarity, and flavor are controlled by special processing and the juice goes through several steps of preparation previous to filtration. It is during this filtration that a striking change in the appearance of the product takes place. It is converted from greenish, foamy juice to a brilliantly clear, amber colored solution of sugar. It is then ready for the vacuum evaporators in which it is reduced to the finished product—a sorghum syrup of standard density, light color, bland flavor, and high clarity.

All Parts of the Sorghum Plant Are Utilized

To return to the seed heads, we find that they have been deposited on the top apron of a six-story drier. When they have arrived at the bottom of the drier they are conveyed directly to a thresher. The threshed seed is usually not yet sufficiently dry for storage, so it is passed through a grain drier and then a cleaner. The clean seed, with a moisture content of 11 to 12 per cent, is sacked, and it is then ready for storage until it is sold for planting purposes. The manipulation of the seed is entirely mechanical, involving slat, screw, and bucket conveyors at different places; and the movement of the seed is practically continuous throughout the process.

Meanwhile the leaves have entered their drier and have been distributed mechanically in an even layer. They pass continuously through the drier, emerge from it with a moisture content of 10 per cent or less, pass through a grinder and come to rest either in a box car or a bag as sorghum meal, ready for mixing into cattle feed. This meal contains between 10 and 12 per cent protein.

Since standardized products are desired and, indeed, achieved, and since this means careful control at every stage, the laboratory is just as much an integral part of this business as it is of beet sugar manufacture. The laboratory decides when the cane is ready to cut; it checks the amount of sugar entering the mill against that in the syrup produced; it controls the efficiency of the mills, the acidity of the juice, the density of the syrup, the use of processing materials; it exerts vigilance over the drying of the hay and of the leaves; it tests every batch of seed for germination; it supplies analyses of the feed; during the spring and summer it conducts fertilizer tests.



Crushing mills used with Sorghum cane

Another achievement of the laboratory is the production of a strain of Minnesota Early Amber sorghum cane. It is a pure line strain, selected primarily for syrup production, but with the forage requirements in mind, since the bulk of the seed is sold for forage purposes. It is from 7 to 12 feet in height, depending on season and soil, and is very uniform in height in any one field. It matures in about 90 days, yields from 8 to 15 tons of dry fodder per acre, and has an average sugar content in the juice at maturity of 16.2 per cent. It is known now as Waconia Amber.

The Pfund honey grader, as adopted by the bee division of the United States Department of Agriculture, has been adopted for use on sorghum syrup and all syrup is sold by the color units of this instrument. Thus, this syrup can now be merchandised by specification of both color and density. But the tongue must still be used for deciding on flavor.

The new sorghum syrup is only in part a competitor of the old fashioned product. It is so much milder in flavor and lighter in color that it is really a new product. And this is what is demanded by modern tastes, for consumers in this country have been educated away from inferior, cruder products and toward higher quality in all lines of commodities.

One of our agricultural experiment stations has published recipes and methods for utilizing sorghum seed for human food. With this in mind, and not forgetting the ground feed beloved of the average porker, it is not hard to visualize a sturdy and complete American breakfast coming from this one crop plant—a pile of pancakes, a pan of sausages, and a jug of sorghum.

Steam, Diesel or Electric Power—Which is Cheapest?

By THEODORE R. OLIVE
Assistant Editor, Chem. & Met.

DURING the spring of 1923 The Suckow Milling Company, Franklin, Ind., millers of winter wheat, received an unexpected jolt in the shape of a formal notice from the boiler inspector to the effect that the old boiler that had served long and faithfully was condemned. Boilers have a way of dying of old age in spite of the best of care, and sometimes the demise comes very inopportunely although it is usually conceded that death from old age is generally to be preferred to an explosion.

This condemnation was particularly serious because the wheat harvest was only four weeks off and, while one may hedge the wheat market, hedges are not deliveries of flour to customers whose business is worth holding. Something had to be done, and done quickly.

The mill had a capacity of 400 barrels a day and power had been furnished by a single 150-hp. boiler furnishing steam for a 275-h.p. engine. The boiler had been driven considerably above its rating for a number of years, which, however, is nothing unusual, for a smaller boiler driven above its rating will furnish steam more cheaply than two boilers performing the same service at a 100 per cent rating.

For several years it had been known that the boiler would some day have to be replaced and the decision had been made to install a larger boiler of 300 hp. when the proper time came. Price quotations from reliable firms indicated that the new installation would cost $7,000. But a new boiler would require for its fabrication, transportation, and setting far too much time. Also its installation would involve the cuttings of a new hole in the stack, new breeching and a higher roof over the boiler house, to say nothing of connecting the steam header, and hooking up the boiler room accessories such as feed water heater, pumps and the like. And there was the old boiler to be taken out, and a large section of wall to be torn down to make way for its exit and to permit the new one to be brought in. It would have been nearly Autumn before the mill could be ready to go again.

Electric power was obtainable from the local public service corporation at the following rates:

First	100 kw.-hr. per month	@	0.07	per kw.-hr.
Next	300 kw.-hr. per month	@	0.05½	per kw.-hr.
Next	600 kw.-hr. per month	@	0.04½	per kw.-hr.
Next	1,000 kw.-hr. per month	@	0.03¾	per kw.-hr.
Next	2,000 kw.-hr. per month	@	0.03	per kw.-hr.
Over	4,000 kw.-hr. per month	@	0.02½	per kw.-hr.

Motors were quickly available and nothing needed to be torn out. Even the old boiler could stay where it was. In consequence, the plant was motorized and was ready when the new wheat crop came in. There were purchased three-phase, 440-volt motors as follows: 2—7½-hp., 1—20-hp., 1—50-hp., 1—150-hp. This installation cost $3,000 for motors and $1,000 for switches, compensators, and other accessories, totaling $4,000. There was no transformer charge. As would be expected there was no fault to be found with this source of power except the shut downs that came when lightning caused trouble somewhere along the transmission line.

Electric power costs per barrel of flour, however, proved to be between 17 and 19 cents, whereas in the days of steam power, while no accurate figures are available, a mechanical engineer has figured that it was between 11 and 12 cents per barrel. The hypothetical differential amounting to approximately $28 per day, or over $8,000 per year, was not a pleasing expense to contemplate. It was equal to the probable cost of a new boiler every year, even when more than 90 per cent of the power was purchased at the lowest possible rate of $0.02½ per kw.-hr. The power cost of 17 to 19 cents per barrel

in good years went higher when a poor crop of winter wheat curtailed operations and caused a greater percentage of the purchased power to be figured in the higher brackets. Competition from millers in other markets forced selling prices unpleasantly close to cost and again something had to be done.

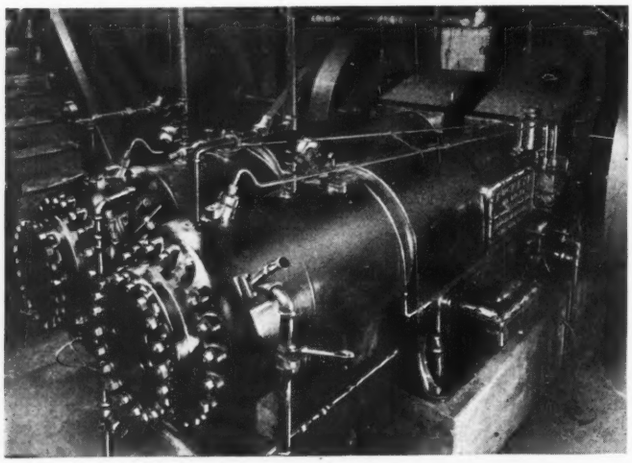
A wood working factory in the same city had purchased a Diesel engine a year previously and was generating its own electric power. Its accurate costs extending over a year were enough to stimulate an investigation of the suitability of a similar engine as a source of power for the flour mill. It was decided that by using it with belt drive, it would, in all probability, prove a desirable investment. The old line shafts were still in place and in good order. Belts had been properly cared for. All that was needed was the engine, a jack shaft, and a clutch.

The entire equipment was purchased on contract for $15,000, involving a 260-hp., 2-cycle, solid injection, cross head type Diesel engine installed and operating; fuel oil tank; jack shaft, belt, and clutch; and removal of the old steam engine. To this figure should be added the value of those of the motors that were turned in as part of the purchase price. There was some talk which quickly subsided as soon as the plant went into operation about the undesirability of the noise of the exhaust. The exhaust was delivered through the usual muffling devices into the old brick smoke stack with the result that very little noise could be heard.

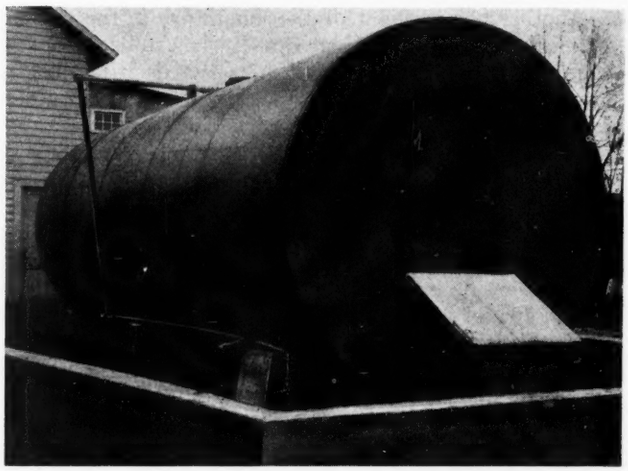
After two years of operation the following data have been obtained:

Cost of cooling water and lubricating oil, per barrel of flour	$0.045
Cost of fuel oil, per gallon, delivered	0.045
Cost of Diesel power per barrel of flour	0.09 to 0.10

The figured power cost includes interest and depreciation figures. No labor is charged to the engine room as the man who runs the engine looks in only occasionally and most of the time is engaged in other work. A 50-light belted generator, driven from the line shaft, provides the lighting of the plant when the engine is operating. One 50-hp. motor was retained so that the grain elevator might be operated independently of the engine in case the latter should be shut down and for this purpose, as well as for lights under similar conditions, there is still a small amount of electric power purchased outside.



Diesel engine installed in the old engine room



Large fuel storage capacity permits purchasing of fuel oil at bargain prices and holding for future use

On the basis of 300 working days per year and capacity operation of 400 bbl. per day during the period, and figuring the power cost saving at only $0.08 per barrel, the money saved will amount to $9,600 per year. This is the maximum possible saving and, as very few of the smaller plants of any kind operate at capacity, the actual saving is somewhat less. The owners of the mill believe that Diesel engine installation will pay for itself in three years if the basis of comparison be purchased electric power. It has proved to be even more economical than the old steam power plant and when compared therewith shows a saving of between $1,500 and $2,000 per year.

The figures covering the operations with the three different sources of power are particularly interesting because they are directly comparable, and indicate that power costs should receive most careful scrutiny and analysis.

Paprica Shipments in Spain No Longer Require Certificate of Purity

The curious regulation existing in Spain since 1903 requiring that all rail shipments of paprica must be accompanied by a certificate of purity issued by governmental authorities and countersigned by the railroad has been abolished by a Royal Order upon the representations and recommendations of the President of The Paprica Exporters Association. The manner of handling paprica shipments has been changed, because of the burden imposed upon local laboratories by the 30,000 analyses required annually in the Province of Murcia alone, the delays of shipments caused by the inability of laboratories to furnish certificates promptly, together with the fact that this unique regulation, in reality, serves merely to guarantee that the railways shall be paid freight on rejected returned shipments in case they have been found to be adulterated.

The certificate of purity, which served no other useful purpose than to obviate possible rejections at the coast, and was not a guarantee to foreign buyers, is no longer required. At present only a cash deposit sufficient to defray possible return charges is required.

DOUBLE EFFECT EVAPORATION

for the Milk Industry

By LAMBERT J. WISCHERATH
Buffalo Foundry and Machine Company, Buffalo.

CONCENTRATION of milk by the evaporation of part of its water is the first step in converting a highly perishable material into a staple product that can be kept for a long period of time without deterioration. It permits milk to be shipped and used at points where fresh milk is not available, as well as to utilize the surplus milk of the flush periods of production by preserving it for future use when production is at low ebb. The delicate nature of milk requires that the process of concentration by evaporation be conducted at a temperature well below the pasteurizing point. This is essential if the finished product is to retain the properties of raw milk, with the albumenoids and milk solids left in their original and easily digestible form.

Commercial manufacture of these products commenced in 1856 when Gail Borden obtained a patent on the use of a vacuum pan for the removal of water from milk, thus making it possible to manufacture a new class of dairy product. For a number of years the vacuum pan has been employed for this purpose, and still is so employed. It embodies the same basic principles of operation as those claimed by Gail Borden in his original patent claim. About fifteen years ago the Buffalo Foundry and Machine Company developed a new type of milk evaporator; one applying the scientific principles of evaporation to the production of concentrated and evaporated milk products, and at the same time overcoming some of the difficulties inherently peculiar to the vacuum pan. Structurally this milk evaporator differs from the vacuum pan in several very important respects. The vacuum pan consists usually of a large upright cylindrical vessel provided with heating coils, its method of operation being generally as follows: A quantity of milk is placed in the pan; the contained air is partially ex-

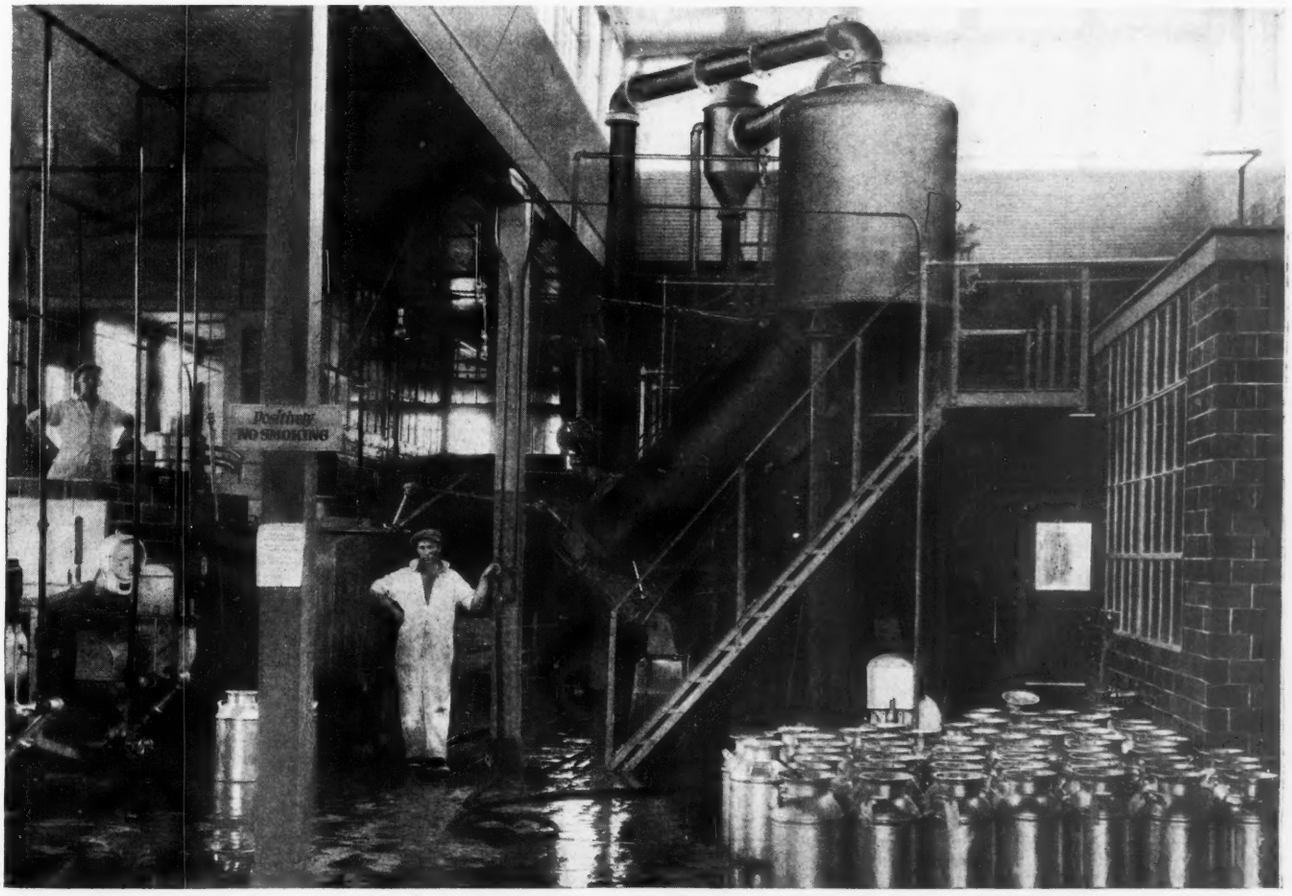


Fig. 1—Double effect evaporator installation in a large milk condensery

hausted; steam is admitted to the heating coils, whereupon concentration begins. When the desired point of concentration is reached the entire batch is withdrawn from the pan.

The Buflovak milk evaporator consists essentially of three parts; the steam chest, the down take, and the vapor body, arranged as shown by the accompanying sectional view. The operation of the milk evaporator differs radically from that of the vacuum pan. In the former, the milk is processed rapidly and in such fashion that only a small quantity of milk is held in the evaporator at any time.

The process is operated in the following manner. A partial vacuum is established inside the evaporator, including the vapor body, the tubes, and the down take. Steam to operate the evaporator is admitted to the steam chest and constantly surrounds the outside of the heating tubes. The milk to be evaporated or condensed is pre-heated and then drawn into the evaporator by vacuum at a point near the top of the steam chest extension. A portion of the milk instantly vaporizes, or "flashes," when it reaches the inside of the evaporator because the temperature of the milk when it is admitted is equal to or higher than the corresponding boiling point under the vacuum maintained in the evaporator. The milk circulates rapidly up the heating tubes and is discharged at a high velocity against the baffle plate in the vapor body. Upon striking the baffle plate the milk is deflected in such manner as to fall directly into the conical bottom of the vapor body. From there it flows into the down take and is re-circulated. The released vapor from the milk is free to expand in the vapor body, being removed from the evaporator through the vapor opening provided at the top. A pipe of large diameter connects to this opening and conducts the vapor to the condenser, the vapor being condensed by a spray of cold water in the condenser. The water together with the air and non-condensable gases, is removed from the condenser by a wet vacuum pump.

Some of the outstanding advantages of this type of evaporator are that only a small quantity of milk is required in the evaporator; it is rapidly evaporated and quickly discharged as a finished product; because of the rapid circulation and short exposure to the heating surface the finished product possesses excellent flavor, light color, uniform velvety texture and absence of curd. More evaporation from each square foot of heating surface results because the rapid circulation of the milk gives greatly improved heat transfer.

There are no losses from boiling over or entrainment, a result of the fact that foaming is confined almost entirely within the heating tubes. Any remaining foam is broken up when the milk is discharged against the baffle and deflected through the down take for re-circulation. Continuous operation is available and the construction is such as to make it thoroughly sanitary and very easy to clean. Sweetened condensed, evaporated skim, and evaporated whole milk in standard concentrations can be produced more economically with this type of equipment.

Double Effect Evaporators Offer Substantial Economies

Where large quantities of milk are to be evaporated the double effect evaporator offers new economies in production cost because it cuts in half steam consumption and cooling water requirements. The double effect milk

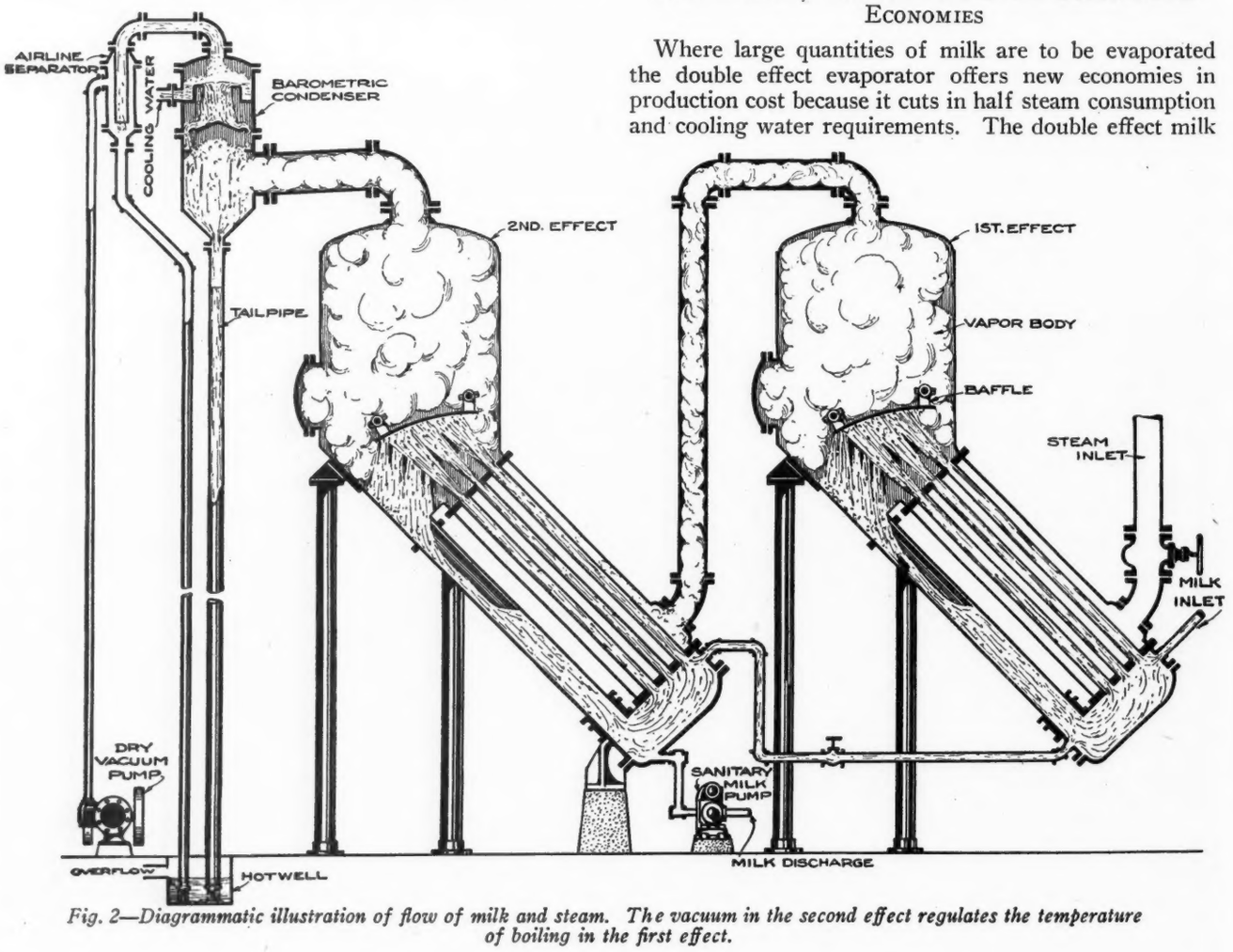


Fig. 2—Diagrammatic illustration of flow of milk and steam. The vacuum in the second effect regulates the temperature of boiling in the first effect.

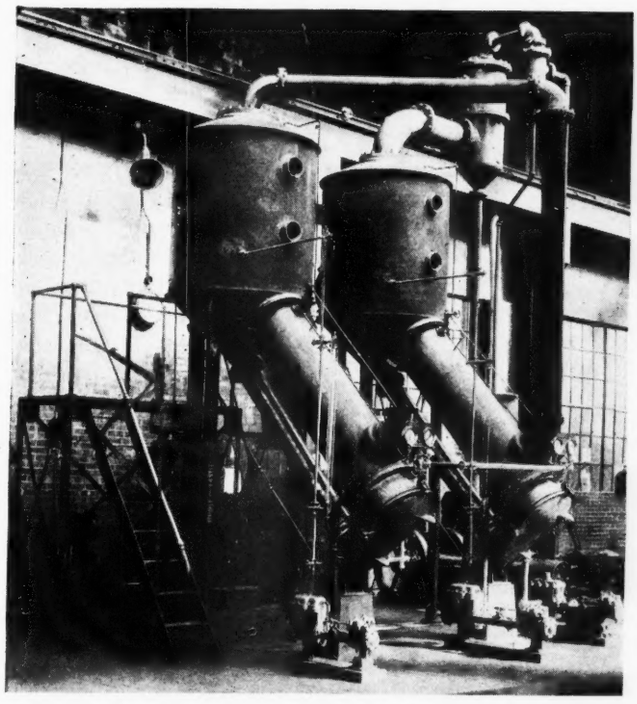


Fig. 3—Double effect evaporator set up in the shop for testing its capacity before shipment

evaporator employs the same principle of multiple effect evaporation that is successfully used in many industries where large quantities of liquids must be evaporated with minimum steam consumption. In reality it is two evaporators, designed especially for that purpose, working together.

Their operation differs from a vacuum pan or single effect evaporator in that the double effect utilizes the heat given off by the boiling milk in the first effect. In single effect evaporators and vacuum pans this heat is lost when the vapor passes through the condenser. As the steam is made to do double duty approximately half as much steam is required to evaporate a given quantity of milk. Cooling water requirements are proportionately lessened because less vapor remains to be condensed. In addition to lowering production cost through the saving in steam and cooling water this type of evaporator offers all the advantages previously described.

Operation of the double effect evaporator is based upon the principle that the boiling temperature of anv liquid varies with the atmospheric pressure under which it is boiled: the higher the vacuum the lower will be the boiling temperature, and vice versa. Thus, the second effect of the evaporator operates under a higher vacuum than does the first effect, with the result that the milk in the second effect boils at a temperature lower than the temperature of the vapor released from the boiling milk in the first effect. This permits the hot vapor from the boiling milk in the first effect to be used to operate the second effect.

The accompanying schematic sketch shows the general details of construction and it operates in the following fashion. Live steam is admitted to the steam chest of the first effect. Raw milk is also admitted to the first effect, the live steam causing the milk to boil and circulate rapidly up the heating tubes. Striking the baffle, the milk is deflected into the down take and re-circulated. The hot vapor released from the boiling milk expands in the vapor body and is conducted to the steam chest of the second effect. Here, on account of temperature difference, the vapor is condensed and is reduced in volume, causing a partial vacuum in the vapor body and pipe lines of the first effect.

A dry vacuum pump, operating through a barometric condenser connected to the vapor body of the second effect, produces a higher vacuum than exists in the first effect. The boiling temperature of the milk is correspondingly lowered by the higher vacuum, permitting the hot vapor from the first effect to complete the evaporation of the milk. Milk is drawn into the first effect by vacuum, and from the first to the second effect by the higher vacuum existing in the latter. The flow of milk is controlled by valves in the pipe connections. The finished concentrated milk is withdrawn and discharged from the second effect by a sanitary milk pump.

Legal Adjudication Affecting Process and Product Patents

Patentee relieved of complying with certain restrictions that affect product patentees

Editor's Note: *Of more than ordinary interest is this excerpt from the opinion of Judge Rellstab, of the U. S. Court for the District of New Jersey. Although not concerned with the merits of the controversy, which will be determined by legal adjudication later on, it clarifies greatly the haze that has surrounded the legal status of process patents as contrasted with product patents.*

THIS is an action at law to recover damages for an alleged infringement of a patent which expired before the suit was begun. The patent is for a "process of manufacturing anhydrous grape-sugar from corn and analogous farinaceous material."

The defendent moves to strike out the complaint because it fails to allege that the defendant was notified of the infringement. The plaintiff concedes that if such notice is required in the case of a process patent, the present action will not lie, as no notice of that character was given.

Ordinarily, a conscious infringer of a process patent seeks to avoid detection. The more valuable the process, the greater the purpose and preparation of such an infringer to prevent discovery. Obviously, not only detection, but proof of infringement is more difficult in the case of process than in that of other patents.

In the present case the alleged infringement was not discovered until after the patent sued upon had expired. Therefore, unless damages may be recovered for any infringement proven against the defendant, the plaintiff is remediless. Generally stated, a tort feasor is liable in damages for his tort, without advance notice from the injured party.

R. S. Sections 4919 and 4921 authorize the recovery of damages from infringers of patents. R. S. Section 4900, however, imposes certain limitations on that right. This section reads—

"It shall be the duty of all patentees and their assigns and legal representatives, and of all persons making or vending any patented article for or under them, to give sufficient notice to the public that the same is patented; either by fixing thereon the word 'patent,' together with the number of the patent, or when, from the character of the article, this cannot be done, by fixing to it, or to the package wherein one or more of them is inclosed, a label containing the like notice: Provided, however, That with respect to any patent issued prior to April 1, 1927, it

shall be sufficient to give such notice in the form following, viz., 'Patented,' together with the day and year the patent was granted; and in any suit for infringement by the party failing so to mark, no damages shall be recovered by the plaintiff, except on proof that the defendant was duly notified of the infringement and continued, after such notice, to make, use, or vend the article so patented."

The duty to mark patented articles was first imposed in 1842, and was limited to such as were vended or offered for sale. Not until the passage of the Act of March 2, 1861, was any limitation put on the injured party's right to recover damages. By that act he was deprived of that right, unless the person making or vending the article patented, marked or labeled it or gave the infringer actual notice of the infringement. This statute did not embrace all patented improvements. It expressly limited its application to "cases where an article is made or vended by any person under the protection of letters patent."

Thus the matter stood until the passage of the act entitled "An Act to revise, consolidate and amend the statutes relating to patents and copyrights," approved July 8, 1870. It is conceded that the statutes prior to this enactment did not apply to process patents or where the patented article had not been manufactured.

Defendant contends that section 4900 includes process patents as well as articles not made or vended by the patentee. * * * However, it is clear that * * * the duty to give notice—constructive or actual—is limited to tangible things, viz., "patented articles"—things that can be marked or labelled. A process, as ordinarily understood, is not an article, and cannot be made to carry the prescribed notice. Its very character defies its being marked or labelled.

* * * If Congress had intended to include process patents within the prescribed duty of giving notice, one would expect to find words selected aptly to embrace them. These we do not find in R. S. section 4900. Indeed, in my judgment, the words of this enactment are so inept for that purpose, that it should not be given the all-embracing grasp contended for by the defendant, unless the decisions interpreting it leave no alternative.

There are few cases dealing exclusively with process patents, and of these none was concerned with patents which had expired before suit was brought. Of the cases cited by counsel, two only dealt with process claims. Both of these—*United States Mitis Co. v. Carnegie Steel Co.* and *United States Mitis Co. v. Midvale Steel Co.*—are founded upon the same patent, one for improvement in a process of manufacturing castings from wrought iron and steel, by adding aluminum. In the Carnegie case Judge Acheson said: "The patent in suit is exclusively for a process, and therefor the case is not within either the letter or the spirit of section 4900." In the Midvale case Judge Acheson's opinion was cited approvingly by Judge Archbald.

However, the decisions reached in these cases did not rest exclusively on this ground. The Court in each case was of the opinion that the defendants, at any rate, were answerable in damages from the time the bill was filed, as they had persisted in the infringement after suit was brought; the bringing of suit being treated as the equivalent of the statutory notice. See, also, Judge Archbald's reference to this ground in *American Caramel Co. v. Thomas Mills & Bro.* The affirmance of the Carnegie case, without opinion, added little, if anything, to the authority of that case, as the affirmance of the lower Court's decision might have been based on any of the reasons given by the district court. However, the question whether section 4900 embraced process patents was directly in issue in both of the United States Mitis Company cases, and the Courts' answers that it did not, are not more dicta, even though both Courts found other grounds to sustain their decisions. See *Railroad Companies v. Schutte.*

All the other cases cited by counsel as interpreting this section dealt with patents covering machines or other tangibles which, if made, were capable of being marked. In only one of these, *Churchward International Steel Co. v. Bethlehem Steel Co.,* is there any intimation that process patents are within section 4900. In that case Judge Dickinson in the course of his opinion said: "There are a number of cases which rule that the statute does not apply to process patents, because there is no patented article made or vended; but these cases will be found to have been so ruled before the act of 1870, or to have been ruled on the authority of these prior cases, without the change in the statute having been noted." What cases Judge Dickinson had in mind, is not disclosed, but it is evident that the United States Mitis Company cases, supra, could not have been included, as both, as well as the cases cited therein on the point here considered, were decided after the passage of the Act of July 8, 1870. The patents considered by Judge Dickinsin were for products termed "alloyed steels," and the question whether process patents were embraced in section 4900 was not in issue, and the quoted views of this learned judge are pure obiter.

The other cases cited by counsel—*American Caramel Co. v. Thomas Mills & Bro.; Son v. Pressed Steel Co.; Flat Slab Patents Co. v. Northwestern Glass Co.* and *Flat Slab Patents Co. v. Turner*—dealt with mechanical patents, i.e., a machine to cut caramels, door constructions, and metallic and concrete flooring, respectively.

In calling these cases to the attention of the Court, counsel for the defendant stress some of the remarks made by the various writers of the opinions filed therein, particularly those in the Flat Slab Patents Company cases, and argue therefrom that the reasoning employed carries process patents within the grasp of section 4900. It is true that some of the language employed in discussing the precise question there determined, gives comfort to counsel in their purpose, but it does not support their contention. There is no affinity between the question raised there and the one here, and there is nothing in the controlling facts or in the opinions of any of these four cases, that suggest that the writers of these opinions had, even remotely, process patents in mind.

However, while none of the cases cited and relied upon by counsel for the defendant dealt with process patents, the case of *Parker Rust Proof Co. v. Ford Motor Co.* is directly in point and supports the defendant's contention. In that case two of the four patent claims involved, undoubtedly covered a process. Judge Tuttle applied R. S. section 4900 and denied the recovery of damages and profits prior to the time actual notice of infringement was given. So far as appears, the learned judge, in thus concluding, relied solely on *Westinghouse Electric & Mfg. Co. v. Condit Electrical Mfg. Co.* and *Muther v. United Shoe Machinery Co.* These cases, however, did not involve processes, but mechanical devices, viz., circuit breakers and eyelet setting tools, respectively, and there is nothing in the judicial views expressed therein that suggests the thought that section 4900 embraced process patents.

For the reasons herein given, the defendant's motion is denied.

Technology Adapts MATERIALS HANDLING to Needs of Candy Maker

By ROBERT GORDON GOULD
Assistant Editor, Food Industries

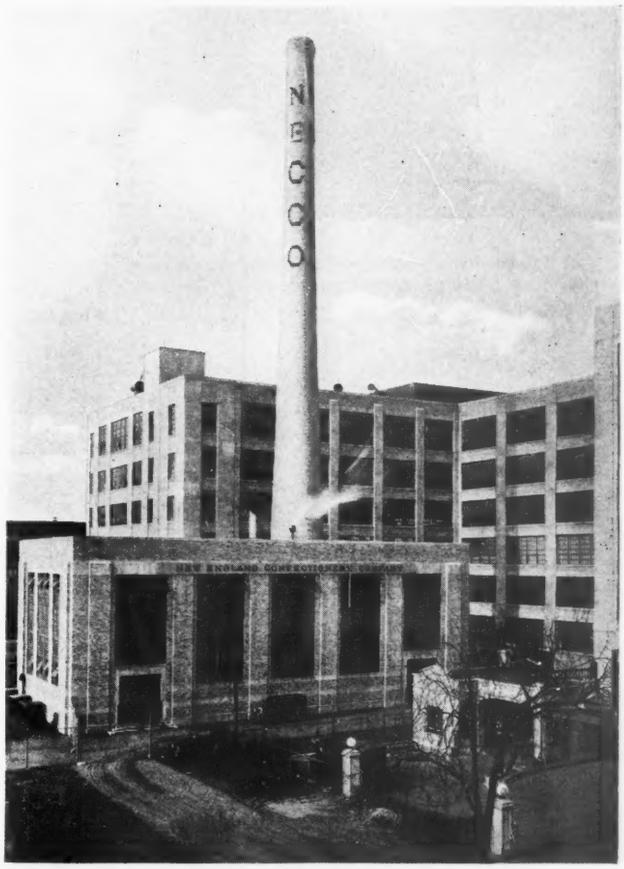
PRESENT-DAY CONFECTIONERY manufacture involves the handling of sugar, corn syrup, chocolate, nuts and fruits, milk and cream, butter honey, molasses, and many other foods, together with much in the way of packaging material. In their new plant on Massachusetts Avenue in Cambridge, the New England Confectionery Company, with the able assistance of Lockwood, Greene Engineers, Inc., made ample provision for the most economical handling, as well as the most modern practices of processing, of the many items that go to make confectionery; as is apparent by careful study of the accompanying pictorial matter, supplemented by the text.

Provision was also made for handling the Company's very considerable output of packaged chocolate creams, Necco wafers, block lozenges, pan work, gum candies, fudge, hard candy, nougat, peanut-bar, marshmallow—and the specialty known as chocolate cream cakes. The 500 or more named items on the sales list come from some ten basic candy divisions or groups, a fact that helps to simplify some of the problems connected with processing and conveying in the shop.

For local shipments and for receiving truck deliveries of locally produced material, there is on the ground floor an enclosed court with a capacious platform that connects with one side of the large room devoted to the handling of boxed goods of all description. Mechanical conveyors are provided wherever they may be used advantageously, and greatly facilitate the handling of heavy cases of product of raw material. In this way, hundreds of tons are handled easily and expeditiously by a relatively small number of men.

Speaking generally, all supplies (except sugar and corn syrup) are carried by elevators, that transfer goods from the ground floor to the upper floors as needed; are moved from place to place on the same floor by mechanical conveyors of one sort or another; and from upper floors to those lower down by conveyors or gravity chutes. The most impressive of the latter is the huge, double-blade, friction spiral that handles the heaviest of packed cases and debouches on the ground floor, where it connects with a Matthews mechanical conveyor of the ball-bearing, steel-roll type.

On the ground floor level are two spur tracks with receiving and shipping platforms alongside—all under cover for protection from inclement weather. Thus is much cartage obviated, with its attendant delays and expense. All in-freight is unloaded from the cars and handled on the receiving floor by trucks and mechanical conveyors of appropriate sorts. In this way are handled all raw material and supplies, except corn syrup and certain locally produced items.



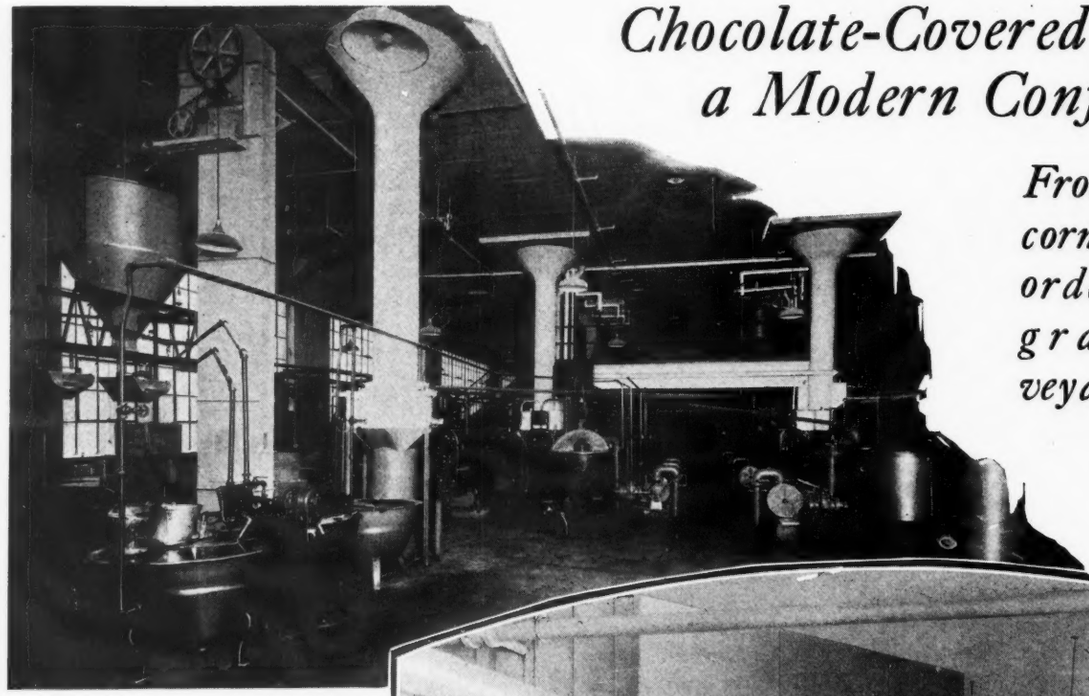
Where the necessary power for the New England Confectionery Company is developed

On one of the spur tracks may be spotted tank cars of corn syrup, which are thereupon enabled to discharge by gravity direct to the battery of storage tanks that is located immediately beneath the railroad tracks. In the aggregate the six tanks hold 30,000 gallons of syrup and from them that essential of the modern confectionery "mix" is pumped as needed to the kettles on the upper floors. Throughout the plant it is handled entirely by Kinney rotary pumps, through steel pipes. Its flow is from the basement storage tanks to temporary storage tanks above the roof, whence it is distributed by gravity to the several manufacturing rooms. Not only is this a highly economical method of handling corn syrup but also one that insures cleanliness.

In this New England plant, far distant from the beet fields of the West, we find no beet sugar but rather

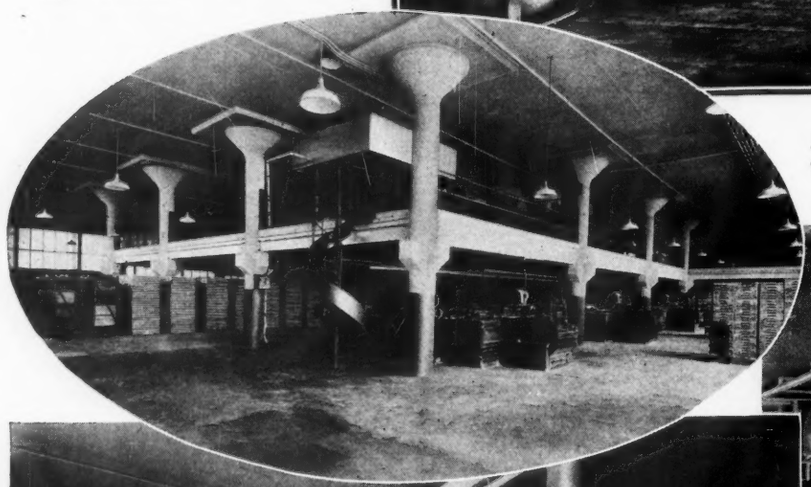
Chocolate-Covered Products on a Modern Confectionery Ma

From the upper left t corners the product orderly course, mot gravity and mech veyance wherever possi

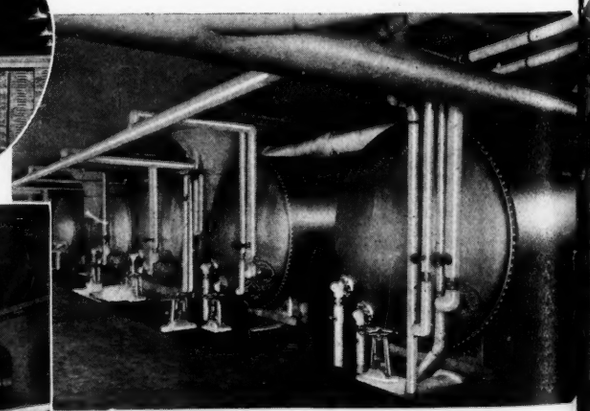


The sixth-floor room in which chocolate coatings are prepared is shown above.

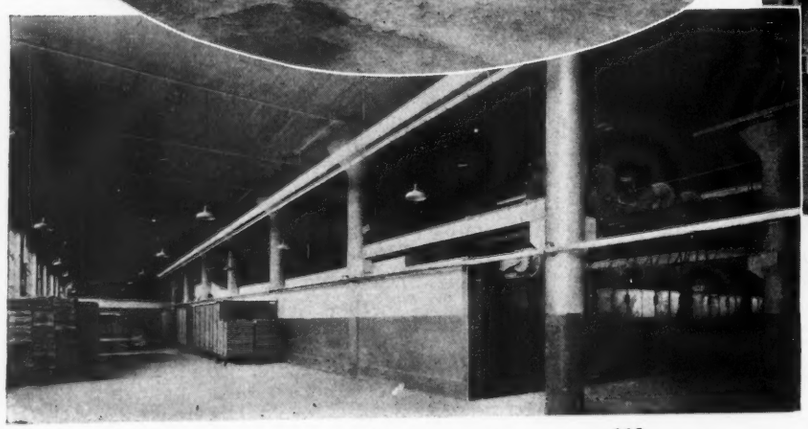
Below is pictured a corner of one of the starch rooms, where cream centers for chocolate-covered candies are made.



Here are mixed the centers for chocolates, the hoods carrying off the moisture.



Above—The battery of corn syrup tanks, filled from tank cars overhead.



Left—A drier for hardening cast centers.

All choc canvas co

ucts on Their Way Through nery Manufacturing Plant

upper left to lower right
prod uct follows an
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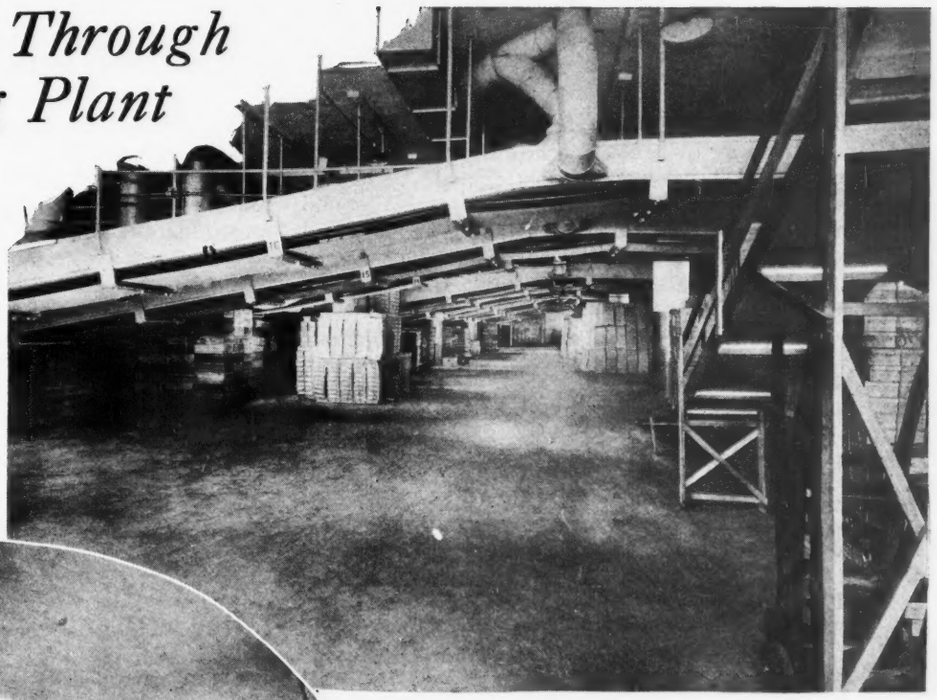
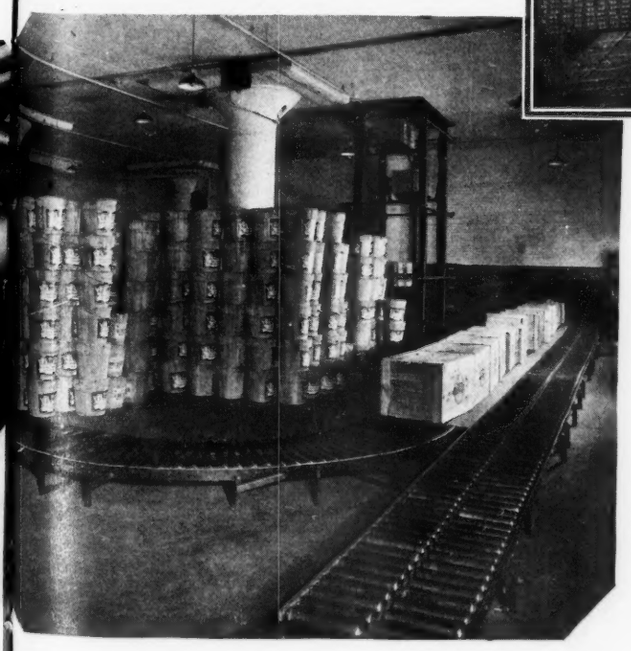
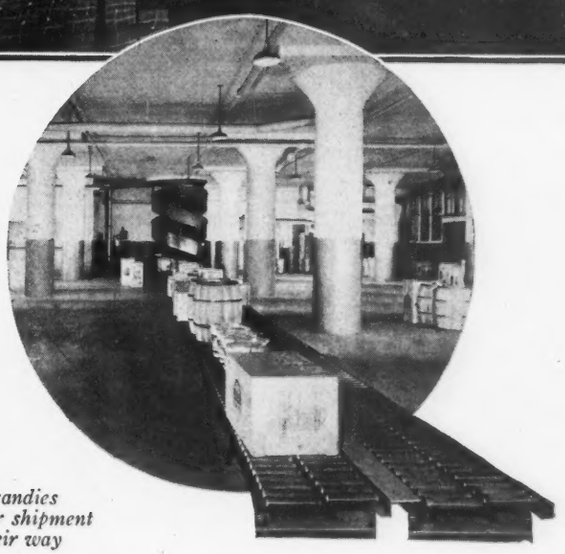
and mechanized con-
rever possible.



Endless belts carry chocolate-coated candies from enrobers to packing tables shown at the left.

All chocolate-covered candies are packed on these canvas conveyors.





Packed candies ready for shipment or on their way to the consumer.

granulated cane sugar that is refined in nearby establishments. It arrives by truck, packed in barrels, which move to the bucket elevators without delay. All barrels and other wooden containers are opened on the ground floor, lest foreign matter (wood, nails, and the like) find its way into the manufacturing departments.

Sugar from the opened barrels is emptied into a hopper that feeds a bucket elevator, very much like a flour hoist, that elevates the bulk sugar to the top floor. Here it is transferred to a screw conveyor that feeds it into several temporary storage tanks; from them it goes, by gravity, to melting kettles and thence in the form of syrup to the supply tanks above the roof. An accompanying photograph displays to advantage a sugar-working unit, in which the weighing scale is to be discerned immediately below the conical bottom of the bin. Each separate weighing is slid a few feet along the trolley rail to the nearby mixer—or open, steam-heated kettle, supplied with an agitator for blending the several ingredients.

In assembling the output much use is made of fondant, the creamy center of the justly popular chocolate cream. This is essentially a mixture of cane sugar solution and corn syrup, so processed that it takes the form of a white plastic. Its nature is such that it may be remelted, by heat, and allowed to re-form without impairment of quality. Thus there has developed the custom of permitting fondant to remain in box trucks until re-melted and fed to the moguls, or starch-casting machines peculiar to the candy trade. In view of the fact that true straight-line production is theoretically possible with the cream centers that are subsequently to be coated with chocolate and sold as chocolate creams, this establishment, among others, has developed a unit for working fondant based upon the principal of continuous action. In consequence, certain of their cream centers are made of fondant that has been piped from boiling kettle to mogul—without the customary intervening setting and re-melting. So far, no very great proportion of the day's output is handled in this manner but its feasibility has been demonstrated, and in connection with top-quality goods—a most significant augury for the future of mechanized chocolate cream manufacture.

Unfortunately, certain aspects of the operation of the mogul are such as to render even more forbidding the task of synchronizing it with the enrobers, a step that has been under discussion for some time. Incidentally, the enrobers, or machines for coating all sorts of centers with chocolate liquor, are admirably adapted to straight-line handling, which lends zest to the attempted synchronization of the moguls.

The mogul is a highly ingenious, specialized machine that is used to mold marshmallows, gum candies, and centers for chocolate creams, and other coated candies. When in operation, the hopper is kept supplied with material of the desired sort, re-melted to a liquid consistency. Wooden trays full of loose starch are placed in one end of the mogul, the starch being smoothed to an even surface while in transit. When the tray of starch approaches the other end of the machine, a die presses down to form rows of smooth impressions in the starch. As each row of impressions in the starch is moved under the hopper by the machine, a measured amount of bulk cream, gum, or marshmallow, as the case may be, is forced down through nozzles to fill the impressions. The trays are then arranged in stacks and taken by trucks to a space on the floor for either cooling or drying, depending upon whether they contain creams or gum work centers. The next step is to again feed the trays through the mogul, whereupon the starch and the hardened cast pieces are dumped upon a wire screen which catches the candy pieces and shakes them off to one side where they are passed through a cleaning device which frees them of all loose starch and permits them to flow forward, or downward, for further processing.

One of several rooms where pan goods are either made or polished, producing items that lend themselves but slightly to mechanical handling

The starch is screened and collected within the mogul for immediate re-use. With the exception of the handling of the trays, on the floor, the operation is entirely automatic.

Chocolate coating for covering cream centers is prepared by milling to a fine paste a mixture of chocolate liquor, cocoa butter, and granulated sugar. Chocolate coating is still applied, to a very small extent, by hand—for the affluent but misguided few who fancy that it makes a product better than that from the machine. Chocolate creams made by machine have a tell-tale perfection of contour that is denied their hand-made equivalents. As a matter of fact, none but an expert can distinguish visually between the two sorts of coating, and to the palate—or to the expert blind-folded—they are identical. As any candy man can attest, machine coating is by far the neater operation, *per se*.

Happily, relatively few customers still call for hand-dipped chocolates, a fact that is reflected by the vast array of enrobers, or mechanical coaters, installed on the fourth floor, and fed with chocolate through steel pipes. The enrober is another specialized machine, developed for the candy trade. It coats with chocolate centers of all sorts, ranging in size from a tiny peppermint drop to a relatively large peanut-bar. Centers are fed to the machine by hoppers that shake them out on a canvas conveyor, where an attendant arranges them in such fashion that they will travel through the enrober without any piece touching its neighbor.

From the canvas conveyor they pass to a wire mesh conveyor, chocolate gushes up from below and coats the bottoms, and a curtain of chocolate falls from above and coats the tops and sides. Excess chocolate drains back into the reservoir of the enrober for future use. Another canvas conveyor picks them up and carries them forward and then on overhead to a chilled tunnel long enough to cool them and harden them sufficiently for packing. Air in the enrober room is conditioned for temperature and relative humidity.

The chocolate packing department is located on the fourth floor. Here chocolate-coated goods travel directly across the building, starting with the application of the coating by the enrobers, just described, and ending as finished goods packed for shipment. Intermediate steps include passage by conveyor through the cooling tunnel where the chocolate coating is hardened and delivery at the packing table in front of the girls as shown in the accompanying picture. The actual packaging is motor-paced hand work; about as highly mechanized as seems possible with the average candy product.

In connection with chocolates—and ordinarily they constitute about half of the total output—the handling operations may be summarized as: mechanical for the sugar and corn syrup and for a small, but significant, portion of the resultant fondant, and from the enrobing stage to the packing table; with manual operations involved in connection with the re-melting of the fondant, the tending of the moguls, the trucking of the cast centers, and all packaging. Some of the manual operations are really of a semi-mechanical sort because of their being supplied with material and packages by motor-driven conveying belts.

The manufacture of Necco wafers and other lozenges well illustrates the downward flow of material. Granulated sugar is ground to a powder on the fifth floor; on the fourth floor it is sifted through very fine bolting cloth, none but the finest of the powder passing, by gravity, to the working platform on the third floor. Here a great funnel, rolling on an overhead track, receives it from above and feeds it to a battery of mixers where flavor and color are added and the mass made plastic. Then it is fed between rolls that leave it relatively thin for Necco wafers and somewhat thicker for the other forms of lozenge.

The lozenge machine stamps lozenges from broad strips of the prepared paste at a high rate of speed, the perforated ribbon being collected immediately after the cutting operation and returned to the head of the machine for reworking. These machines are also capable of printing, with certified food colors, an inscription on each piece. The lozenges pass on a belt conveyor to a mechanical, steam-heated drier of the endless belt variety which delivers the product, practically moisture-free, to a mixing device for proper assembly of flavors, which in turn delivers the product to the packing table on the floor beneath. Here girls assemble them like stacks of poker chips and roll them by hand in transparent paper. The photograph reproduced on the front cover shows the very substantial mechanism that has been developed to handle Necco wafers. The conveyor belt carries the wafers from the hopper in the ceiling to the packaging table. Packed boxes are then brought back on the steel roll conveyor which starts at the far end of the room and ends at a chute situated to the right.

Speaking generally, the manufacture of pan goods, hard candies, and many other items is largely manual, the mechanical steps being confined largely to the conveying of the constituent sugar and corn syrup to the kettles. Finished products are handled in about the same general fashion as obtains with the chocolate creams and Necco wafers which have been described in detail.

Processed Fruit and Vegetables Can Retain Natural Qualities

By W. V. CRUESS

Fruit Products Laboratory, University of California

IN THE LAST twenty-five years great advances have been made in our knowledge of the microorganisms that cause the spoiling of food products and of methods of preventing or controlling the activities of these agencies of decay by suitable methods of sterilization, pasteurization, use of antiseptics, fermentation, and cold storage. However, emphasis has in the past been placed on keeping the product rather than on keeping its fresh flavor, its fresh aroma, and its fresh color. As a consequence many of our well-known preserved food products are sadly lacking in freshness. True, they are palatable, and we are fond of them and as a nation use them in vast quantities, despite their deficiency in the foregoing respect. Today our automobiles, radio receiving sets, airplanes, other important mechanical devices and many products used in every-day life are greatly superior to those of five years ago; our consuming public as a result of these improvements is becoming more discriminating in respect to its food. We want the best, and should have it if it is attainable at a reasonable price.

At one time we were perfectly content to drink oceans of synthetic imitation orange drinks, and we believed most of the fairy tales that appeared on the label; now we must have real orange juice, most of it prepared afresh before our eyes by fountain dispensers in spotless uniforms. What has been done with oranges can readily

be done with other fruits. Apples, grapes, berries and pomegranates all yield delicious fresh juices. Simple fountain equipment for expressing the juices of these fruits is already available. Means of storing the fresh fruits in frozen form throughout the year are known. There is therefore no good reason why one could not step up to a drink counter and call for and receive a drink of freshly pressed grape or apple or other fruit juice, whether the fruit is in season or not. Incidentally, these fruit drinks are most healthful; we should all drink more of them.

For many centuries, undoubtedly since early Biblical times, man has subsisted during the winter months to a large extent on dried foods; dried meats, dried fruits, dried fish. Sun drying has been and is the time-honored method of drying these food products, but the sun deals harshly with the fresh flavor and the fresh color of such foods. Grapes after sun drying lose the fresh white color of the Muscat or Thompson grape; they become brown and weasened raisins. They are powerfully good as raisins, and we wouldn't want them different, but they are totally different in character from the fresh products. Other fruits also lose most of their freshness when dried in the sun. Our present knowledge of dehydration by artificially produced heat under carefully controlled conditions would make it possible to improve greatly the "freshness" of our dried foods. In the past the public has bought dried fruits on price; possibly we would now be willing to pay the slight extra cost of dehydrated fruits in return for their undoubted higher quality. Some dehydrated fruits retain much of the fresh-fruit flavor and are excellent for eating out of hand, as one would eat candy.

Most manufacturers of jellies, jams, and preserves still use the open kettle for cooking these products to the finishing point. Vacuum concentration is well past the experimental stage and has been proved time and again on a commercial scale to make jams, preserves, and jellies far richer in fresh flavor, color, and aroma than similar products made by boiling in the open. In this connection it would seem better to use glass-lined equipment than that made of a metal of a sort that will react with the coloring matter of the fruit.

In the evaporation of water from fruit juices, for the preparation of concentrates for the soda fountain and beverage trades, too little attention has been given to important details that make for the preservation of freshness. An extremely high vacuum is necessary to avoid development of a "cooked" taste; 29-in. vacuum is none too high, although it is admittedly difficult to attain and maintain in commercial practice. Immediate vacuumizing of juices after expression from the fruit is desirable, in order to minimize changes brought about by oxidation. Flash pasteurization at a relatively high temperature, followed by immediate chilling, is desirable for some fruit juices, in order to destroy enzymes that produce undesirable changes in flavor and color in the finished concentrate. Packing the concentrates in vacuum-sealed glass containers and storage at a low temperature (*e.g.* 30 to 40 deg. F.) until used best retains the flavor and color.

Perhaps the hard-boiled fruit concentrate and syrup manufacturer will say that such methods are too costly. In reply it may be stated that probably the principal lack of public interest in these products is due to their lack of fresh flavor, color, and aroma. Speaking of aroma, this volatile constituent of fruits is exceedingly difficult to capture and hold in concentrated fruit juices. However, if the excess water of the fresh juice is removed by freezing, instead of by boiling, most of the fresh aroma and flavor are retained and concentrated to a marked extent and appreciably in proportion to the water removed by freezing. Methods of fractionating and redistilling the distillate from vacuum concentration of fruit juices are now known and have been used commercially. Doubtless, these methods could be improved, standardized, and adapted to general commercial practice with vast improvement in retaining the volatile flavoring and aroma-giving constituents of concentrated fruit products.

Similar observations can be made concerning the manufacture of concentrated tomato products such as tomato paste. During my visit to Italy recently I was informed by one of the leading food chemists of northern Italy that tomato-paste manufacture has been modernized in the larger factories by replacing the old-style open kettles with up-to-date pans operating at a high vacuum. The paste made in these pans possessed a beautiful color and a rich flavor. A large manufacturer of tomato products in California has been very successful in the use of a vacuum concentrator of unique design for the concentration of tomato pulp to paste. At one time he was accused of adding artificial color because the color of his vacuum-concentrated products was so much brighter and clearer than that of pastes made in the usual manner.

Though we all like our favorite fresh vegetables even after they have been canned and preserved by sterilization by heat, still we must admit they are not up to the freshly picked vegetables in respect to fresh flavor and color. The deep-green color of the cooked fresh spinach, or peas, or string beans has been lost. And we do not know altogether why. The flavor too has been changed. Although the flavor is good, it could be better. Perhaps the new method known now as "Geralizing" will help the canner to retain more of the freshness of his canned vegetables.

However, I believe that the greatest possibilities for the retention of the freshness of our common garden vegetables, such as peas, corn, string beans, spinach, and several others, lies in freezing storage in small containers of proper design and of proper materials of construction. Several years of small-scale experimentation and many semi-commercial trials have proved that the method has great potentialities. Space does not permit a discussion of the details of the new processes at this time, but a full presentation is promised for a later issue of this journal. The same method, of course, is already applied successfully to berries for retail distribution. In this day of the electric refrigerator, and other means of cold storing foods in the home, and in view of freezing-storage facilities in many retail markets, the new methods would not be difficult to put into practice. True, they would not completely, or even perhaps in any great degree, replace our present methods of vegetable preservation, but they would supply to those willing to pay the slight extra cost a variety of products of fresh flavor and attractive color.

Other examples could be cited, but enough have been given to illustrate the probable line of improvement in methods of food preservation in the future. In the past we have given our attention to preserving the product without due regard to retention of its freshness; we are convinced that it will repay us in the future to concentrate our attention on preservation of those delicate flavors, aromas, and colors, that distinguish the fresh products from those preserved by the usual commercial methods.

Accurate and Economical Packaging In Moisture-Proof Containers

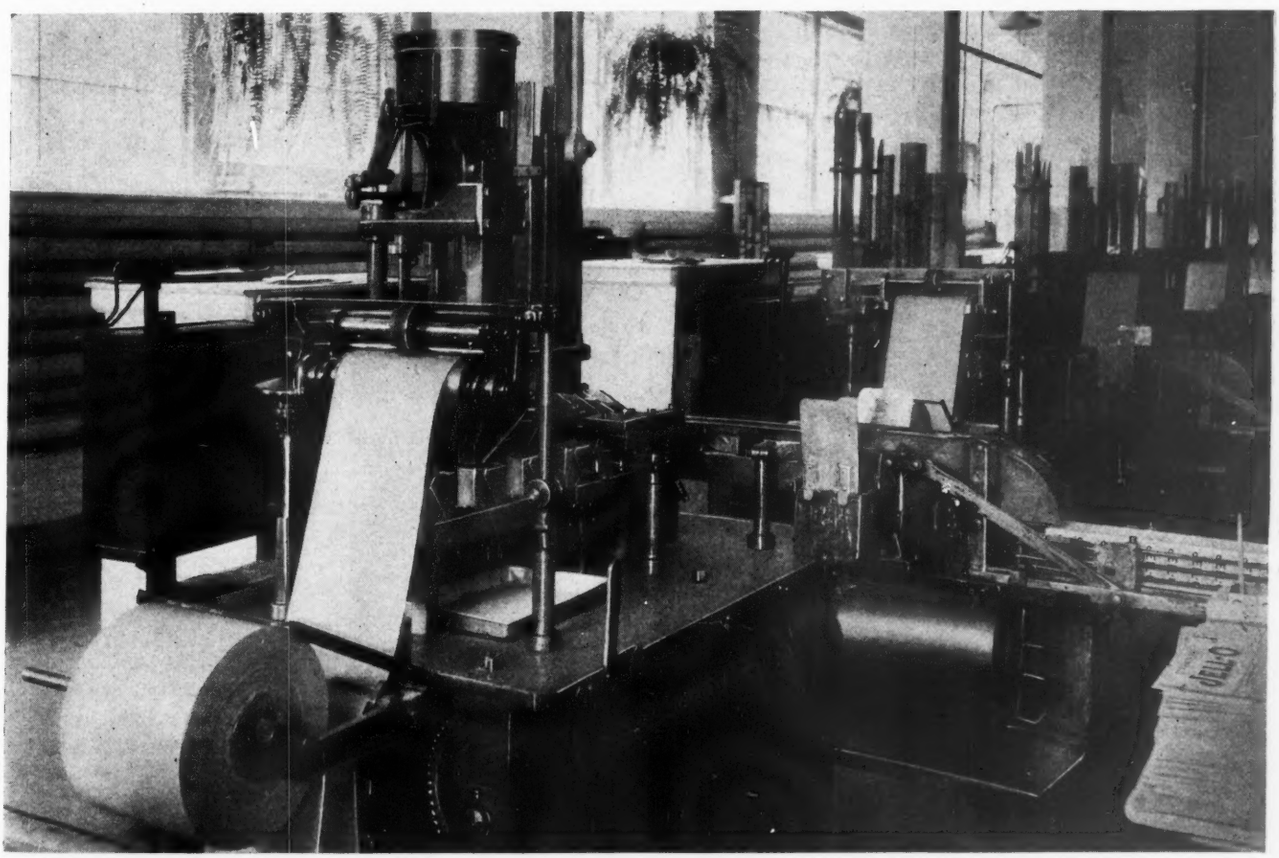
By Laurence V. Burton
Assistant Editor, Food Industries

ALTHOUGH Jell-O is not a perishable product, nor even one of semi-perishable nature, the operations of the factory at Le Roy, N. Y., where it is made, are so conducted that the stock of finished goods on hand amounts to less than a single day's shipments; except that at the beginning of the rush season there is usually a supply of finished goods on hand amounting to a week's shipments.

The manufacture of Jell-O involves but two unit operations: mixing and packaging. The latter will be described in this article for it has been worked out to a highly efficient degree in this plant.

The product is a free-flowing powder compounded of sugar, gelatin, fruit acid, and flavor. After mixing and drying upon an upper floor it flows by gravity through tubes to the filling machines which pack, fill, and seal the cartons. These are largely a development by the E. D. Anderson Company of New York City with certain modifications worked out by the Jell-O Company. They are driven by ½-hp. d.c. motors running at approximately 300 r.p.m. Direct current is used in order to obtain closer regulation of speed than is possible with alternating current motors. Each filling machine has a capacity of between 20 and 35 packages per minute. The factors limiting higher speeds are the time elements required for proper folding of liner and carton flaps and the possibility of imparting a momentum to filled cartons that might carry occasional individuals beyond the proper stations for the several operations. There are 49 filling machines required to put out the entire domestic production.

The liner is of paraffined paper supplied in rolls. As it is fed into the machine it is sheared to proper lengths and then pressed down into a folding device that makes it into an envelope with the coated side facing the product. Mounted on top of the hollow plunger that forms



Simultaneously forming and filling the liner in a single operation

Pinching the top of the liner, folding, inserting into the cartons, and sealing are automatic operations

the liner is the reservoir of Jell-O, which is constantly fed through a tube from storage bins on the floor above. Within the hollow plunger is the measuring device with its adjustment which is operated by a cam motion to discharge a measured volume of product into the formed liner at the moment the folding operation is complete.

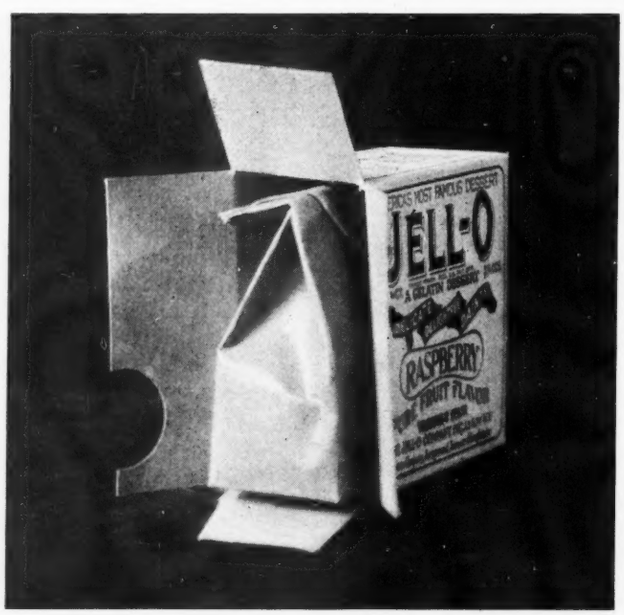
Lugs moving intermittently now carry the loaded liner envelope to the next station where the top is folded. At the second station the top is pinched between two dies that partially perforate the paper and cause the two sides to stick together without the use of adhesives. The top of the closed liner is then bent over upon itself at the third stations from which it is pushed into the formed carton. By folding the top over, as illustrated, an air-tight contact is made that effectually prevents any air transfer. Since moisture will cause the product to harden in the package the success of this operation becomes the most important feature of the whole packaging program.

One girl does all the packing and inspection for each filling machine and another girl divides her time between two machines, keeping them supplied with paper, cartons, and the like. The inspection, aside from visual inspection for any improperly sealed cartons, consists in weighing each dozen packages on a scale whose weights are so adjusted that any short-weight package is instantly detected.

The individual machines are subjected to periodic inspection by a test clerk who carries an accurate balance from place to place and determines the actual net weight put into packages before the cartons are sealed. Any adjustment of fill that may be necessary is done by the test clerk.

The importance of extreme accuracy of fill cannot be over-estimated for each machine will fill over 16,000 packages per day. During the rush season the total number of packages filled daily will be in the vicinity of a million. When fractional errors are multiplied by a million the net result may be a very large amount, and at least two of the constituent ingredients (gelatin and true fruit flavors) are fairly expensive.

After their inspection, the filled cartons are packed into solid fiber cases and then placed on a belt conveyor that carries them to the sealing department. Here are located three fully automatic, top-and-bottom, standard box sealers. The sealed cases are discharged onto a wide roller conveyor that delivers to the shipping room, where the various flavors are segregated for making up orders. Although three different lines of goods are discharged onto the common roller conveyor the different goods preserve their relative positions with respect to each other so that no mixing occurs. This feature, that facilitates work in the shipping room, also obviates the need for separate conveyors for each line.



The folded top of the liner makes an air-tight seal

Simplified Methods of Calculation *for* BELT CONVEYORS

By HARRY F. GEIST
Engineer, Webster Manufacturing Company, Chicago

A GENERAL STUDY of belt conveyor problems was published in the November and December, 1927, issues of *Chemical and Metallurgical Engineering*. In them, tables were presented which were broadly intended for all bulk materials usually moved by belts. However, while the tables are applicable to grain handling, they are based upon the use of heavier belts than are commonly employed for grain work.

Grain belts differ from those designed for heavy and lumpy materials chiefly with respect to the loading, the speed, and the weight of belting used; with due regard for the enormous volume of grain handled daily, it is thought the subject merits a special study and a parallel set of tables meeting its problems.

While the following tables relate particularly to the handling of grain, being based upon practices common to large terminal elevator installations, they, of course, may also be used for the solution of other similar material handling problems, when proper regard is given to specific gravity, lump, abrasiveness and other physical and chemical properties of the material to be conveyed.

In general, if the material can be handled on a light grade of conveyor belt without danger of cutting or otherwise injuring the belt, the problem falls within the scope of this article and its tables.

As a basis of procedure, and for a common understanding, these tables apply directly to grains weighing 60 pounds to the bushel. All calculations necessary to the compiling of these tables were made by graph or slide-rule and are believed sufficiently accurate for general engineering use.

TROUGHED BELT CAPACITIES

Figure No. 1 shows a typical troughed belt in section with its carrier rolls. It shows for purposes of comparison, the cross section of the ribbon of grain carried under different loadings, i.e., the $2.2w^2$ loading and the $2.5w^2$ loading, also the level full condition about $3.3w^2$ and the hypothetical heaped full condition $5.5w^2$. In the above loading expressions, w is the width of the belt in inches, the coefficient in each case being such as to give the volume in cubic feet per hour which would pass a given point with a belt speed of 100 feet per minute. The equivalent bushels are obtained by dividing the above expressions or results from them by about 1.25.

Calculations based upon a $2.2w^2$ loading agree very closely with capacities listed in Webster Manufacturing Company's catalogue No. 48 on page 369, which are based upon average results in the field with belts carried on troughers and flat rolls spaced alternately every 6 to 6½ feet. If troughers are spaced every 6 to 6½ feet, and provision for better loading is made, higher ratings may be considered,—see $2.5w^2$.

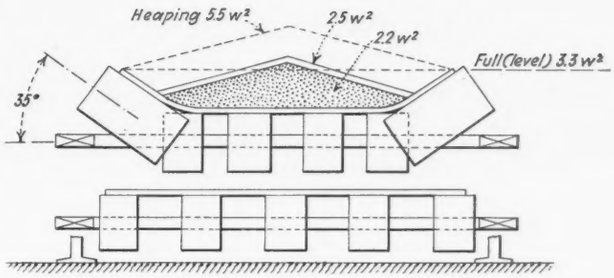


Figure No. 1—Cross-section of typical troughed belt

While it has been found thoroughly practicable to convey such materials as coal, crushed rock, sand, gravel, and ore, on belts loaded as high as $3.0w^2$ and $3.5w^2$ by employing a closer setting of belt carriers and by running the belts at relatively lower speeds, it has been found more advantageous to operate grain belts at higher speeds with lighter loads per foot of belt. This is feasible because in grain the problem of lump is not involved. However, the effect of windage on spillage due to high speeds becomes a limiting factor.

In the high-speed conveyor there is a material advantage in machinery required, namely less reduction in speed between the driving motor and the conveyor head-shaft, with a simpler mechanical hook-up; less noise; less loss in power; and fewer belt carriers. The load carried per foot of belt is a development involving chutes and devices designed to give the grain the same velocity and direction as the belt without side spatter.

The goal to be attained in conveyor design is the highest ultimate capacity with minimum spillage. Other factors affecting the loading and the capacity of belts are conveyor slope, if any; spacing of flat and troughing carriers; angle of troughing rolls; use of trippers; protection from wind and other conditions which have a bearing upon spillage. Spillage must in all cases be kept as low as possible because of the commercial value of the commodity.

Most conditions considered, the $2.2w^2$ loading has been found practical by actual experience and is recommended for general use for belts 24 inches wide or over.

As an example, from the above expression $2.2w^2$ we see that for a 36-inch belt

$$2.2w^2 = \frac{2.2 \times 36 \times 36}{1.25} = 2{,}300 \text{ bushels per hour at 100 feet per minute}$$

If the belt is run at a maximum recommended speed of 700 feet per minute, the maximum capacity derived is $2{,}300 \times 7 = 16{,}100$ bushels per hour.

Table No. 1 gives a list of the capacities for various

belts ranging from 18 inches up to 48 inches. The capacities are given in terms of cubic feet per hour and bushels per hour for a unit speed of 100 feet per minute for both the $2.2w^2$ and the $2.5w^2$ loadings. The maximum recommended speeds and the maximum resulting capacities are also listed for convenience. The table also shows the coincident weights of material carried per lineal foot of belt, being based upon 60 pounds to the bushel as previously stipulated. This value (60 pounds per bushel) is convenient because the number of such 60-pound bushels per hour divided by the belt speed in

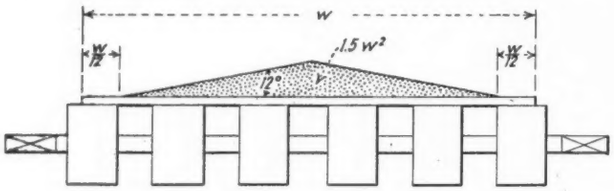


Figure No. 2—Flat belt in cross section

feet per minute gives directly the weight of material carried per foot of belt. Also it is the average weight of a bushel of wheat.

The maximum recommended speeds listed in Table No. 1 are exceeded in some well-known installations, by as much as 25 per cent, without causing grain to blow or spill from the belts, but for general practice is not advisable, particularly for the narrower belts. For narrow belts the ratio of the material carried per foot of belt to the weight of the belt itself falls off rapidly and gives a condition of much less stable motion than is true for the wider belts.

Many Factors Must Be Considered

The effective friction values for both plain grease bearing type and anti-friction bearing type belt carriers are also listed in Table No. 1. These friction factors have no direct bearing upon the carrying capacity of belts, but they do enter in consideration in analyzing belt stresses, machinery stresses, length of haul, and other factors, to be discussed later.

Referring again to Fig. No. 1 we see that fully one-half of the carrying belt width lies flat while the sides are troughed about 35 degrees. A belt with a large percentage of its width lying flat will run truer and be easier to train than a belt excessively troughed. Practice varies considerably as to the angle of troughing, ranging from 20 degrees, or less, to as much as 45 and 60 degrees. It is evident from the illustration that troughing is not the dominating factor assuring capacity. Capacity is more limited by loading methods than it is enhanced by troughing.

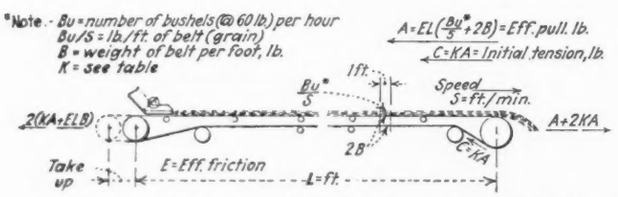


Figure No. 3—Typical horizontal belt conveyor installation

There is a tendency at present in what is known as the unit roll construction, to have the troughing carrier made up of three duplicate rolls, giving a simpler replacement and maintenance list.

Fig. No. 2 shows a flat belt with its carrying idler. For general service a loading of about $1.5w^2$ is considered good practice for most materials, although for grain this can be obtained only by most careful loading. $1.1w^2$ is a safer formula to use for grain work.

Installation Stresses

Fig. No. 3 represents a typical horizontal belt conveyor installation of length L carrying a ribbon of grain loaded on to the belt near the tail end and discharging over the head pulley.

The principal stresses in such a system may be separated as follows—a dynamic force necessary to move the empty belt—a dynamic force required to move the load carried by the belt—and a more or less static force called initial tension which keeps the belt sufficiently taut to assure traction by the head pulley and prevents undesirable sag of the belt between its carrier rolls.

For a horizontal conveyor the dynamic forces, the total of which is A, are required to overcome friction found largely in the carrier rolls which support and facilitate the motion of the belt and its load. For conveyors running up-grade, an additional component necessary to overcome gravity is involved.

For horizontal conveyors the initial tension C is almost entirely supplied by the belt take-up device, but for inclined conveyors, particularly for long ones, the gravitational effect of the weight of the belt and the momentum of the return strand no doubt furnish a considerable percentage of the initial tension.

TABLE 1—TROUGHED BELT CAPACITIES

Belt Width, Inches	Max. Speed Ft./Min.	2.2 W² Loading				2.5 W² Loading				Effective Friction	
		Per Hr. at 100 F/M				Per Hr. at 100 F/M					
		Cu.Ft.	Bu.	Bu/s Lb./Ft.	Max. Bu./Hr.	Cu.Ft.	Bu.	Bu. Lb./Ft.	Max. Bu./Hr.	Plain Bearings	Roller Bearings
18	450	713	570	5.7	2,565	810	650	6.5	2,925	0.126	0.084
20	500	880	704	7.04	3,520	1,000	800	8.0	4,000	0.124	0.083
22	550	1,065	852	8.52	4,680	1,210	975	9.75	5,360	0.121	0.081
24	600	1,267	1,000	10.0	6,000	1,440	1,150	11.50	6,900	0.118	0.079
30	650	1,980	1,600	16.0	10,400	2,250	1,800	18.0	11,700	0.111	0.074
36	700	2,851	2,300	23.0	16,100	3,240	2,600	26.0	18,200	0.105	0.070
42	750	3,880	3,100	31.0	23,200	4,410	3,500	35.0	26,200	0.100	0.067
48	800	5,068	4,050	40.50	32,400	5,760	4,600	46.0	36,800	0.095	0.063

Assuming that the width of the belt and the speed S have been previously determined from Table No. 1, to take care of some desired capacity, the first important step is to compute the forces A required to move the system. These forces, called the effective pull, are tangential to the head pulley and may be expressed by

$$A = EL\left(\frac{Bu.}{S} + 2B\right) \qquad (1)$$

for a horizontal conveyor, and

$$A = EL\left(\frac{Bu.}{S} + 2B\right) + \frac{Bu.}{S} L \tan \phi \qquad (2)$$

for up-grade inclined conveyors. If L is given in feet, if E is taken from Table No. 1, if $Bu.$ is the number of bushels (at 60 pounds each) handled per hour, if S is feet per minute, if B is the weight of the belting per lineal foot of conveyor and ϕ is the angle of inclination (if any), the resulting values of A will be in pounds.

Continuing the example, assume a 36-inch, 4-ply, 32-ounce duck belt with $\frac{3}{32}$ inches of rubber covering divided

between its top and bottom surfaces. Assume further that this belt handles 2,300 bushels of wheat per hour per unit speed of 100 feet per minute. Assume also that L is 100 feet horizontally, and that plain grease bearing type belt carriers are used for which E is 0.105, and that B is 6.7 pounds.

From this data by substituting in equation (1)

$$A = 0.105 \times 100 \left(\frac{2{,}300}{100} + 2 \times 6.7\right)$$

$$= 10.5(23 + 13.4) = 382.5 \text{ pounds.}$$

This force may, for all practical purposes, be regarded as constant for any continuous and steady speed.

The net power required at the head shaft for an operating speed of 100 feet per minute is

$$H.P. = \frac{A \times S}{33{,}000} \qquad (3)$$

$$= \frac{382.5 \times 100}{33{,}000} = 1.16$$

If the conveyor is run at 700 feet per minute instead of 100 feet per minute, the net horse-power will be approximately seven times as great or 8.12 horse-power.

This method of computing horse-power must be understood to cover only the power required to move the belt and its load. In addition there is of course a power amount required to overcome the friction in the head and tail-shaft bearings due to the initial tension thrusts and pulley weights, also an amount of power lost in reduction gears or other driving machinery, so that the above horse-power value may be regarded only as a guide to the size of motor actually required. Although we have such simple rules as add five per cent for cut gears and ten per cent for cast gears, etc., the allowance for the additional power needed to take care of operating losses is a matter of judgment and experience. It is always necessary to be more liberal in proportion for short conveyors than for the larger units.

In order that the head-shaft and its pulley may perform the work of moving the belt and its load without slipping, a certain amount of initial tension must be applied to the belt system by a take-up means. It is convenient and sufficiently accurate to express this initial tension as some percentage or fraction of the effective pull A. If the initial tension factor is designated by K we have the initial tension force

$$C = KA \qquad (4)$$

Continuing the example, if $K = 0.4$

$$C = 0.4 \times 382.5 = 153 \text{ pounds.}$$

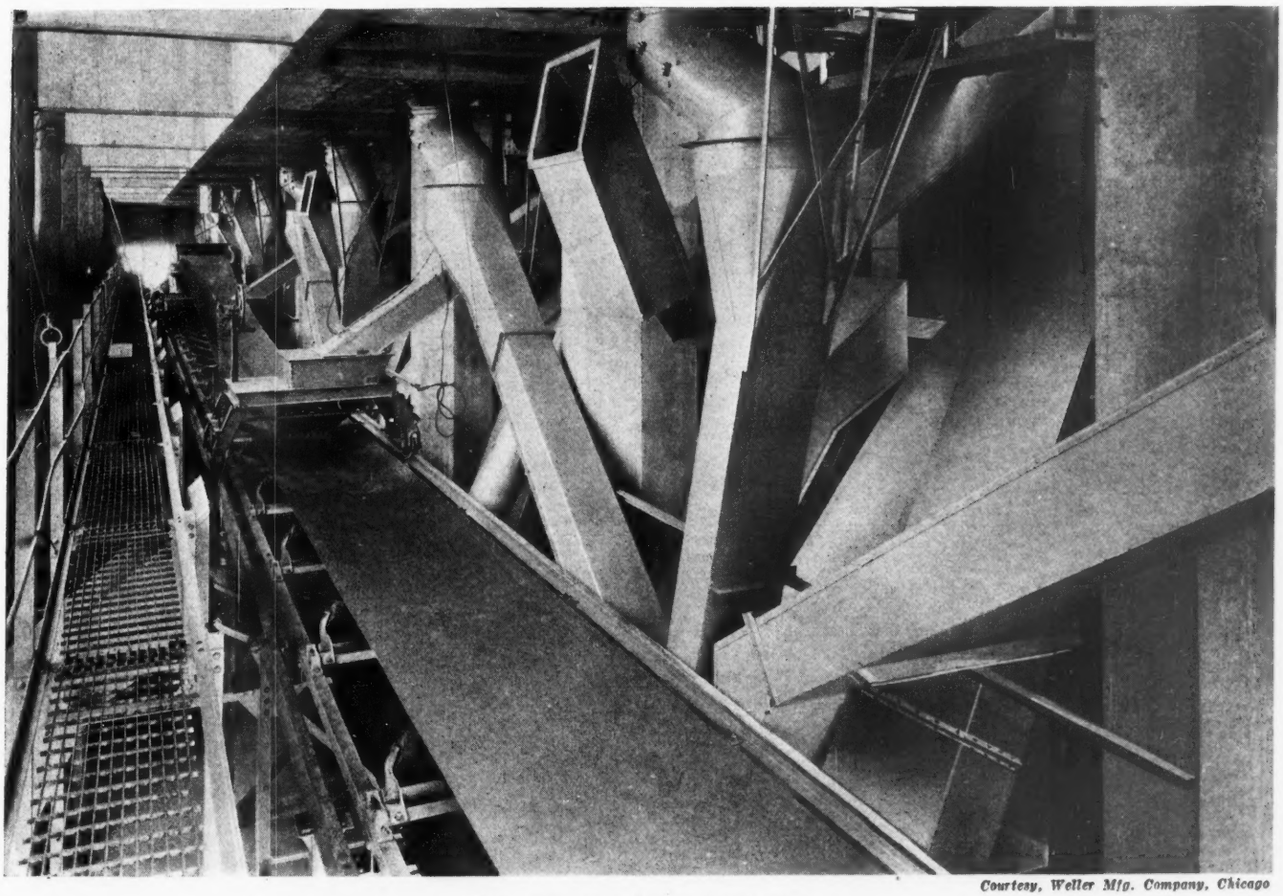
The conveyor belt is therefore under a maximum working stress at the point of tangency with the upper side of the head pulley. The amount of the maximum working stress is the sum of the effective pull and the initial tension, and is

$$D = A + C = A + AK \qquad (5)$$

$$= 382.5 + 153 = 535.5 \text{ pounds}$$

for the example under consideration.

If the maximum permissible working strength of the 36-inch, 4-ply, 32-ounce belt is taken as 27 pounds per inch of width per ply or 3,888 pounds and 535.5 pounds is the computed tension for a conveyor 100 feet long on the horizontal, with plain grease type carriers, and with the belt loaded to $2.2w^2$, it is evident that the maximum



Courtesy, Weller Mfg. Company, Chicago

Belt conveyor with traveling loader

permissible length of haul for the belt under the same condition is

$$L(max.) = \frac{3{,}888 \times 100}{535.5} = 725 \text{ feet.}$$

From the above equations 1 to 5 inclusive and the example, the significance of the factors A and K is apparent. We also see from Fig. No. 3 that the total horizontal reactions at the headshaft is $A + 2KA$, pounds and that the horizontal reaction at the tail shaft is $2(KA + ELB)$. In addition to these we have the weights of the terminal pulleys acting downward vertically, combining with the above to make up the main installation stresses of such a conveyor.

For the sample case under consideration we have

$$A + 2KA = 382.5 + 2 \times 153 = 688.5 \text{ pounds}$$

and

$$2(KA + ELB) = 2 \times 153 + 2 \times 10.5 \times 6.7 = 447 \text{ pounds}$$

which values are based upon $K = 0.4$.

Let us consider results based upon an initial tension factor of $K = 0.7$ by way of comparison. With that assumption

$$A + 2KA = 918 \text{ pounds,}$$

and

$$2(KA + ELB) = 676 \text{ pounds.}$$

Further, K for the maximum belt tension as computed under equation 5 becomes 0.7

$$A = 382.5 + 0.7 \times 382.5 = 650 \text{ pounds}$$

and the maximum permissible horizontal length

$$L(max) = \frac{3{,}888 \times 100}{650} = 598 \text{ feet}$$

as compared with 725 feet where $K = 0.4$.

These few calculations are presented to show the real significance of initial tension on the installation stresses and permissible length of haul.

Initial Tension and Take-up Devices

Initial tension in a belt conveyor system is applied by means of take-up devices. Their purpose is, as previously stated, to keep the belt sufficiently taut to assure traction by the head-pulley and to prevent sag between the carrier rolls.

The most common form of take-up device embodies the tail-shaft bearings slidingly mounted in supporting frames with screws for applying the take-up thrust to the tail-pulley against the conveyor belt. Conveyor belts in operation are subject to stretch after continued use, and to changes with temperature, consequently the means of take-up of this kind requires occasional check up. The amount of tension applied is both unknown and more or less uncertain, and the result is that the operator usually applies more than enough tension. Consequently tables which list the amount of the initial tension factor for screw take-ups call for a higher value needed than for the counter-weighted take-up types.

When a uniform tension is desired, counter-weight methods are used, sometimes at the conveyor tail end, or by means of a counter-weight hung from a pulley floating on the return strand between a pair of snub pulleys. With these gravity types the tension is constant in amount and is uniform, also the amount desired may be applied with reasonable accuracy.

The amount of initial tension required for driving the belt depends upon the degree of frictional contact between the belt and the conveyor head-pulley, hence a head-pulley lagged with rubber belting requires less initial tension than is necessary for a smooth iron face pulley. The amount of wrap of the belt around the head-pulley also has a bearing upon the initial tension required, hence snubbing the belt around the pulley periphery to more than 180 degrees improves the traction with less initial tension.

The relations among these three influencing factors is brought out by the tabulated values of K shown in Table No. 2. These values are reproduced from Goodyear's *Handbook on Conveyor and Elevator Belts,* and are intended to cover the entire range of belt weights and loadings.

For grain work, minimum plies is the rule, and the flexibility of the belts is such that little force is required to bend them around pulleys as compared with that required for the heavier and stiffer belts.

It is the writer's opinion, all things considered, that for grain belts using lagged head-pulleys and screw take-ups, a value of $K = 0.4$ may be taken as a fair average working allowance for the initial tension necessary. Subsequent tables are based upon $K = 0.1$, 0.4, and 0.7 and give thereby a working range which ought to satisfy all conditions.

TABLE 2—VALUES OF CONSTANT "K"

Arc of Contact Degrees	Screw Type Take Ups		Counterweighted Take Ups	
	Bare	Rubber Covered	Bare	Rubber Covered
180	1.00	0.84	0.64	0.52
210	0.81	0.67	0.50	0.40
240	0.66	0.55	0.40	0.32
270	0.55	0.45	0.32	0.25
300	0.46	0.37	0.26	0.20
330	0.39	0.31	0.22	0.16
360	0.34	0.26	0.18	0.13
390	0.29	0.22	0.15	0.11
420	0.25	0.19	0.13	0.09
450	0.22	0.16	0.11	0.07
480	0.19	0.14	0.09	0.06
510	0.16	0.12	0.07	0.05

Slack side tension is the initial tension required in the return run of a conveyor belt, where it leaves the driving pulley, in order to provide the necessary traction between the pulley and belt. The amount of this tension is determined by multiplying the effective tension "A" by the proper constant "K" in table above. For tandem drives, use the sum of the arcs of contact of both drive pulleys.

Sloping Conveyors and Equivalent Lengths

Equation 2 expresses the effective pull required to move a conveyor belt and its load up an incline whose angle is ϕ, in which equation L is the horizontal component of the true course of the conveyor. It is more convenient to express A in terms of the true length of the conveyor, in which case we have

$$A = EL\left(\frac{Bu}{S} + 2B\right)\cos\phi + \frac{Bu}{S} L \sin\phi \quad (6)$$

Since belt conveyors rarely operate at inclinations greater than 20 degrees, of which the cosine is about 0.94 (nearly unity), the cos ϕ factor is usually dropped, and the equation becomes

$$A = EL\left(\frac{Bu}{S} + 2B\right) + \frac{Bu}{S} L \sin\phi \quad (7)$$

For angles of 20 degrees, or less, the tangent and sine are very little different so that equation 7, which is more convenient to use, may be accepted as the correct equation in preference to 2.

Transposing equation 7, solving for L, the true length, we have

$$L = \frac{AS}{E(Bu + 2BS) + Bu \sin\phi} \quad (8)$$

It was previously shown in connection with equation 1 that the force A required to move a 36-in., 4-ply, 32-oz.

TABLE 3—EQUIVALENT LENGTHS

Belt Width In.	Loading	Horizontal Lengths		Lengths on Up Slope, Feet							
				5 Deg.		10 Deg.		15 Deg.		20 Deg.	
		Plain Bearings	Roller Bearings	Plain Bearings	Roller Bearings	Plain Bearings	Roller Bearings	Plain Bearings	Roller Bearings	Plain Bearings	Roller Bearings
24	2.2 w^2	100	150	71.4	93.6	55.5	68.1	45.7	53.9	38.8	44.6
	2.5 w^2	100	150	70.2	91.8	54.1	66.0	44.3	51.8	37.5	43.3
30	2.2 w^2	100	150	67.9	87.8	51.3	62.0	41.5	48.3	34.9	39.5
	2.5 w^2	100	150	66.8	86.0	50.0	60.1	40.3	46.6	33.8	38.1
36	2.2 w^2	100	150	65.8	84.0	49.0	58.4	39.2	45.0	32.6	36.7
	2.5 w^2	100	150	64.8	82.4	47.8	57.0	38.2	43.7	31.8	35.6
42	2.2 w^2	100	150	63.3	80.2	46.3	54.8	36.8	41.9	30.5	34.0
	2.5 w^2	100	150	62.3	78.8	45.6	53.4	35.9	40.7	29.7	33.0
48	2.2 w^2	100	150	62.2	78.5	45.2	53.2	35.8	40.6	29.5	32.8
	2.5 w^2	100	150	61.2	75.5	44.1	51.1	34.7	39.0	28.7	31.4
		Y		Z							

belt conveyor 100 feet long horizontally on plain grease bearings, loaded at $2.2w^2$ is 382.5 pounds.

The value of L at a slope of 15 degrees for the same amount of work is obtained by substituting all the known values in equation 8, from which

$$L = \frac{382.5 \times 100}{382.5 + 594} = 39.2 \text{ feet}$$

The distances, 39.2 feet at a slope of 15 degrees, and 100 feet horizontally for a 36-inch belt loaded per $2.2w^2$ and running on plain grease type carriers, are thus equivalent lengths, because they represent the same amount of work and stresses, and require the same motor for their operation as conveyors.

In compiling a set of belt conveyor tables suitable for grain belts (similar to the general tables presented in *Chemical & Metallurgical Engineering,* December, 1927), intended to show the relation between head-shaft sizes, with their several feasible head-pulleys, and horizontal conveyor lengths; effective pull values; and horse-power requirements for the more commonly used belt sizes, it is necessary to employ such an auxiliary means as equivalent lengths to correct for slope and for anti-friction bearing type carriers. Any set of tables would otherwise be too expansive and bulky for ready reference.

Table No. 3 is presented to attain this end and represents the equivalent lengths for the several belts, and

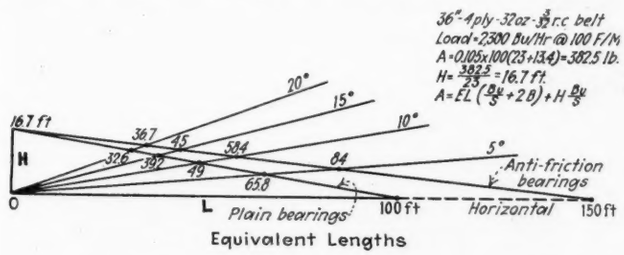


Fig. No. 4—Significance of Table No. 3 shown graphically

loadings for the different conditions of slope and carrier roll bearing types as designated. All the lengths listed across any horizontal line in the table are equal and since 100 feet horizontally with plain grease carriers is taken as the base, the table as a whole may be regarded either as feet or percentages.

The table shows that the horizontal lengths may be increased 50 per cent by the use of anti-friction type carriers. The advantage due to anti-friction carriers drops off as the slope increases. This is logical because the component of power acting against gravity is independent of friction. However anti-friction bearings have other advantages above their frictional advantage and are coming into increased use in all belt conveyor work regardless of the slight power saving affected in sloping conveyors.

The tables to which Table No. 3 is complementary are not included in this issue.

Figure No. 4 is presented because it brings out the significance of Table No. 3. The distances L represent horizontal lengths, 100 feet being for plain grease type carriers and 150 feet being for anti-friction carriers. The vertical distance H represents the height the same load per foot could be elevated with the same amount of work as would be necessary to move the belt and its load the distances L. The hypotenuses marked "Plain Bearings" and "Anti-Friction Bearings" intersected by lines from zero at 5, 10, 15 and 20 degrees will therefore represent distances equal as to stresses as H or L and the diagram thus represents equivalent lengths.

In an early issue of FOOD INDUSTRIES *Mr. Geist will present a further development of this subject.*

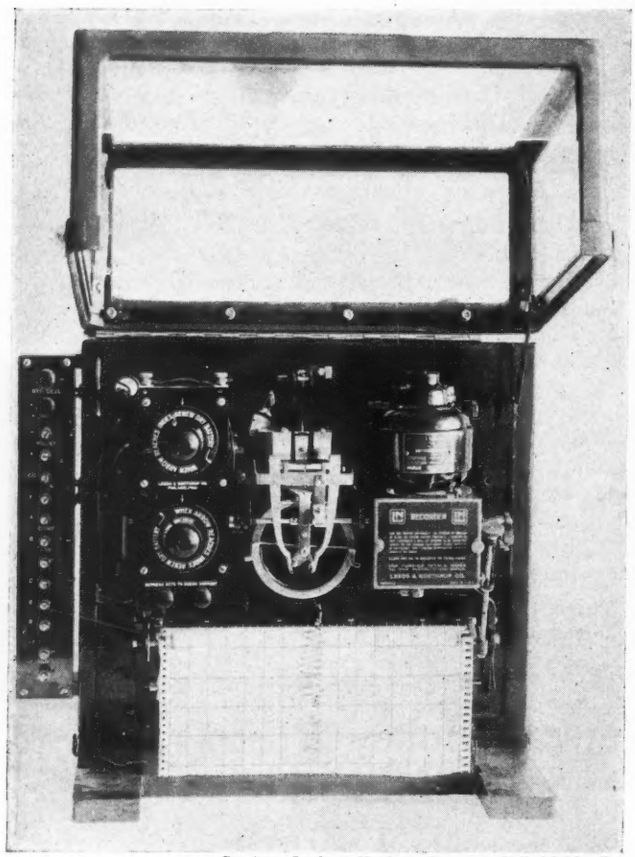
Saving Money in the Making of Sugar Through pH Control

By R. T. BALCH

U. S. Bureau of Chemistry and Soils

AMONG recent advances in the control of sugar manufacture perhaps the most noteworthy is the application of colorimetric or electrometric hydrogen-ion concentration, or pH, methods (1) to the control of clarification processes and the prevention of sucrose losses due to inversion. These methods were first used in raw cane sugar manufacture for controlling the clarification (2) of cane juice by lime and heat. The precipitate which forms on adding lime to cane juice, excluding any cane fiber which may pass through the customary screen, is essentially a compound of calcium phosphate contaminated, of course, with other inorganic and organic substances insoluble under the given conditions. The degree of precipitation of the calcium phosphate is dependent upon the reaction of the treated juice. Thus, at a pH of 6.0 precipitation is slight, but by adding more lime both the volume and weight of precipitate increase until the juice reaches a pH value between 7.5 and 8.5. If these limits are exceeded, the weight of precipitate, or mud, remains practically constant, while the volume it occupies after settling continues to increase considerably until a reaction entirely unsuitable for juice clarification has been reached (3).

In general, therefore, the higher the pH value of the limed juice (up to 8.5 to 9.0) the greater will be the elimination of impurities, but if the clarification is conducted at this high pH value the settling capacity of the factory may be entirely too small because of the increased volume of mud, which would also put an additional burden upon the filter press station. In addition, the juice might have such a composition as would cause the formation of considerable color and deleterious lime salts, and destruction of reducing sugars in the presence of an excess of lime. Considering all factors it has been con-



Courtesy, Leeds & Northrup Company, Philadelphia, Pa.

Recorder for hydrogen-ion beet sugar apparatus

cluded that, in manufacturing raw sugar from fairly mature cane, the best clarification with lime results when the treated juice is brought to a pH value between 7.5 and 8.5. The minimum value should be maintained for juices containing relatively small amounts of phosphates (0.01 per cent P_2O_5), and the maximum value should be maintained for juices high in phosphates (0.03 to 0.04 per cent P_2O_5).

For controlling loss of sucrose by invertion (4) pH methods are superior to all others, for it has been proved conclusively that hydrolysis of sugar commences at a pH value of approximately true neutrality (7.0) and that the rate of reaction increases as the pH value decreases. Thus, to prevent loss of sugar by inversion, it is essential that the pH of factory liquors, particularly liquors in the dilute stages, be kept at a value of approximately 7.0 or above. As a counterpart to the clarification control, it is also now customary to determine the pH of the clarified juice and evaporator syrup so as to be assured that the pH values of these products are maintained at a point which precludes inversion. Keeping the pH value between 7.0 and 7.5 for clarified juice and syrup has been accepted as good practice.

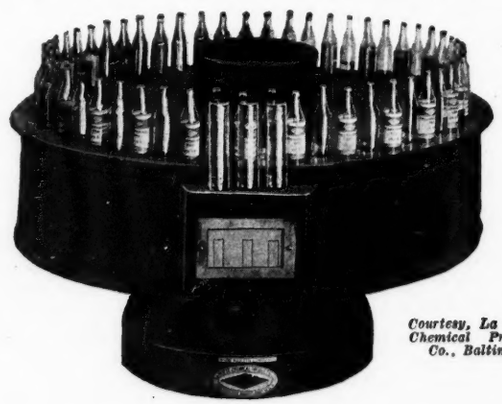
Another application of pH to raw sugar manufacture, although not yet widely adopted, is in connection with the filtration of the muds (5) from the juice defecators, or settling tanks. It has been customary to add a further quantity of lime to the muds in order to obtain better filtration, while paying little attention to the damage done to the juice by the excess lime. High alkalinity causes undesirable color and the formation of lime salts, destruction of reducing sugars, and the peptization of colloidal material of certain types, the products resulting from which pass back into the process and unquestionably affect the yield and quality of the sugar produced. Even if this juice is reclarified this condition apparently can be but slightly remedied. If lime needs to be added to the muds previous to filtration, it seems advisable to use the least quantity possible to insure a rate of filtration which, although perhaps not entirely satisfactory, will not excessively tax the capacity of the filter press station. It appears to be the better practice to maintain an alkalinity of the filtered juice, approximately equal to that of clarified juice so that the two may be mixed and sent directly to the evaporators.

It has long been the dream of sugar technologists to be able to conduct the clarification of cane juice automatically in order to prevent the frequent malpractices of unskilled operators. Realization of this dream is much closer to fulfilment with the advent of pH methods of control, as is indicated by an experimental installation (6) based on electrometric pH principles, which has already been operated under factory conditions. By this method lime is added automatically to the juice in amounts as required by its reaction, while the pH values are recorded simultaneously upon a chart. If the equipment can be made somewhat more trutsworthy, which should result from further study and development, success would be assured with this method of control. The principle of the control is sound, and the advantages to be gained are apparent.

Equally Appropriate with Beet Sugar

The application of pH methods to beet sugar manufacture (7) has been on lines similar to those in raw sugar manufacture, namely, the control of the juice reaction to insure an efficient clarification and likewise control of the loss of sugar by inversion during the later stages of sugar manufacture.

In clarifying beet juice lime is added in large excess, which is precipitated as lime carbonate by means of carbon dioxide. For maximum elimination of impurities the carbonation process must be conducted in two stages. For the most part, the "end point" of the first carbonation process is a matter of judgment on the part of the operator, although a chemical control of a sort—a determination of its titration value—is frequently carried out. Long practice has established the custom of stopping the carbonation at the moment that the precipitate becomes granulated and settles rapidly. If the carbonation is not sufficiently complete filtration of the juice will be difficult; on the other hand, if the juice is over-carbonated a re-solution of harmful impurities will result. Investigation has shown that this "end point" cannot be satisfac-



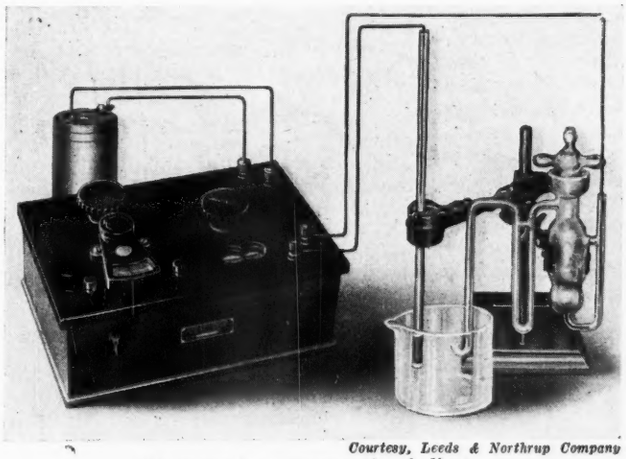
Courtesy, La Motte Chemical Products Co., Baltimore

Roulette comparator

torily gaged by pH determination, hence attention has been devoted, instead, to conductivity methods. As a result of these investigations the principle of electrical conductivity of the juice as a mode of automatic control has been made the basis of an installation in at least one American beet sugar factory (8).

The purpose of the second carbonation is to effect whatever additional removal of impurities is possible, particularly of lime salts, which cause the formation of scale on the heating surfaces with the attendant lowering of heating efficiency that causes trouble in the boiling of syrups in the vacuum pans, as well as decreasing the actual alkalinity of the juice. For the control of this process titration of the juice has been the accustomed procedure but, judging by the adoption of pH methods by many sugar factories, it has become apparent that the maximum precipitation of lime under factory operating conditions can be determined more accurately by a pH method of control than by titration or conductivity methods.

A further step has been made experimentally (9) in which the second carbonation process is conducted automatically and on pH principles, by using equipment similar to that developed for the automatic control of cane juice clarification. This, too, is an advance toward the realization of an ideal, for it is by some method such as this that it will be possible to put on a scientific basis this very important step in the beet sugar process and to eliminate the unsatisfactory intermittent hand control now in use.



Courtesy, Leeds & Northrup Company

Hydrogen-ion concentration indicator

It is modern practice to reduce the alkalinity of the second carbonation juice, after filtration, by means of sulphur dioxide, which treatment also effects some decolorization and possibly a little further removal of impurities. Recently approved methods of control at the sulphuring station, the third saturation, employ a pH method, for here the principal consideration is the prevention of loss of sucrose by inversion during evaporation, which would occur if the sulphur dioxide were improperly used in excess.

Useful With Syrups and in Refining

In recent years the idea of pan-liquor that is neutral to phenolphthalein has been abandoned, and it has become the tendency to maintain the reaction of these syrups as closely as possible to true neutrality (pH of 7.0) without causing inversion of sucrose, as determined by the reducing sugar content of final molasses, which normally is considerably less than 0.5 per cent (10). From an investigation already made (9) it would seem possible to control automatically the sulphuring operation just as is done in the second carbonation—a method which would, it is believed, be a valuable contribution to the technical control of beet sugar manufacture.

In refinery operations the application of pH methods is restricted principally to controlling the reaction of the various liquors in order to prevent loss of sugar by inversion (11). Control of pH has entirely superseded the old titration methods and is considered probably the most important advance that has been made in technical control in the refining of raw cane sugar. Because the refiner operates on a relatively small margin of profit it is very important that the loss of sugar be kept at a minimum, and apparently pH methods adequately fulfill the requirements of a suitable control.

In this paper attention has been limited to specific phases of technical control. These constitute probably the most important aspects of the chemical control of sugar manufacture, for without efficient clarification it is impossible to obtain the maximum yield and desired quality of the finished sugar, and without control of inversion sugar losses would undoubtedly be considerably increased.

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Definition and Standard for Mayonnaise Salad Dressing Announced By Department of Agriculture

That the difficult task of promulgating a satisfactory standard for mayonnaise salad dressing has been accomplished, is told by the recent adoption of a definition and standard by the Secretary of Agriculture, according to an announcement by the Food, Drug, and Insecticide Administration.

The standards and definitions recommended by this committee are not only adopted by the Department of Agriculture for the guidance of its officials in enforcing the federal food and drugs act, but by many states in the enforcement of state laws. In some states the standards and definitions adopted by the Department of Agriculture are, *ipso facto,* official for state use.

The text of the definition and standard follows:

"Mayonnaise, Mayonnaise Dressing, Mayonnaise Salad Dressing, is the clean, sound, semi-solid emulsion of edible vegetable oil and egg yolk or whole egg, with vinegar and/or lemon juice, and with one or more of the following: salt, spice, sugar. The finished product contains not less than 50 per cent of edible vegetable oil, and the sum of the percentages of oil and egg yolk is not less than 78."

ABSTRACTS · OF · CURRENT · LITERATURE

CARBONATION PROCESS. R. T. Balch and J. C. Keane. *Industrial & Engineering Chemistry,* November, pp. 1148-51. The second carbonation process in beet sugar manufacture can be subjected to automatic control by a practically feasible method based on the pH of the juice. The control operates electrometrically; as the CO_2 is delivered to the carbonation process (under constant conditions), the emf. between the tungsten and calomel electrodes, varying according to the pH of the juice, actuates the electric motor connected to the gas valve. The supervision required for maintaining this automatic control consists mainly in changing and caring for the electrodes. Photographs show the factory arrangement of electrodes and flow chamber, the reversing motor, the controller and the recorded. If SO_2 supply to the sulphitation station could be as closely controlled, automatic control on a like principle could be applied for that process also.

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SAUERKRAUT. L. M. Preuss, W. H. Peterson and E. B. Fred. *Industrial & Engineering Chemistry,* November, pp. 1187-90. The gas evolved in sauerkraut formation is practically pure CO_2. Most of it is given off in the first 40 to 160 hours. Close relationship of gassing to acidity and bacteria count indicates that bacteria, not yeasts or plant cells, produce the gas. Rising temperature greatly accelerates the cabbage fermentation which produces sauerkraut; and washing before packing has a favorable effect on flavor. Curves and tables are given to show the relations of gassing, acidity, time and temperature. The apparatus for gas formation study is described and illustrated.

* * *

CARBON DIOXIDE RECOVERY. E. Luehder. *Apparatebau,* Oct. 5, pp. 229-31. Carbon dioxide is such an important by-product of the fermentation industries that its recovery becomes a significant factor in successful attempts to keep production costs down. In this respect, breweries and distilleries have quite different problems. Breweries, generally located in cities, can dispose of a large part of their CO_2 output to their own customers, whereas distilleries are generally in the country and must seek an entirely separate market for their CO_2. Calculations are given, showing the amounts of CO_2 which can be recovered according to the fermentation process and the materials used, and the production amount.

* * *

SUGAR IN BAGASSE. A. H. Allen. *Sugar,* October, pp. 449-50. In the determination of sugar in bagasse, the Spencer rotary digestion method eliminates the necessity of weighing the digester and contents at the end of the digestion; a given weight of water is measured into the container from a burette. A home made substitute for the rotary digestion apparatus is described. A table for use in bagasse analysis is given. It covers a range sufficient for any but exceptional cases in which very high sucrose sugar-cane is being milled.

* * *

CANNING. H. W. Powell. *Canadian Chemistry & Metallurgy,* October, pp. 280-2. In the canning art, the first factor is time between harvest and canning (important for fruits and vegetables subject to rapid spoilage). Next comes time and temperature of the sterilizing treatment. These are governed by prevailing conditions, namely initial temperature, consistency and thermal conductivity of the material (will there be convection currents?), size and shape of container, container material (glass or metal), kind and amount of contamination, pH of the material, temperature of sterilization as related to time, and whether or not the cans are agitated. Purity of materials (water, salt, sugar, etc.) must be carefully controlled, especially to avoid contamination by heat resisting bacteria. Corrosion of cans is minimized by evacuating the cans (by heat) before sealing; by eliminating trapped or dissolved gases; by perfect sealing, and by low storage temperature. Evacuating cans has the added advantage of lessening strain on the cans due to pressure changes, especially during final sterilizing. In contrast to household cooking, canning has little destructive effect on the vitamin content of foods. This is attributed to the more or less complete absence of oxygen during the heat treatment. In other respects also the food value of canned goods is high, because the processing is effected under strict control of sanitary conditions and the raw materials are carefully selected.

* * *

GLASS OR TIN CANS. C. E. Gill. *Chemical Age,* Oct. 20, p. 366. Of the relative hazards of foods in glass or tin containers, the principal risk in tin is the toxicity of dissolved tin; the risk in glass is of glass fragments. Cheap glass often contains air bubbles, which burst when the glass is filled with a hot liquid. The general opinion that infection in cans must have come from an outside source (such as pinhole perforations in tins) is not necessarily true; of many cans tested, about 40 per cent had not been actually sterilized in canning. The range was from 18 per cent in unsweetened milk to 84 per cent in fish and 100 per cent in sweetened milk. On the whole, the risk from infected cans is small; infection is usually revealed by the bulging or "blowing" of the tins. Moreover, the early stages of infection are generally not dangerous; by the time poisons are developed the food has become totally unfit to eat.

* * *

OLIVE OIL. Chas. H. LaWall. *American Journal of Pharmacy.* October, pp. 616-25. Misbranding of olive oil, thought to have been practically eliminated from the industry, has again increased to such an extent that serious effort is needed to break up the practice. The commonest fraud, to be guarded against by analysts and food officials, is to replace genuine olive oil in whole or in part by cottonseed oil, under labels which state or strongly imply that the buyer is getting pure olive oil. Sesame oil is used in the same way, but only rarely.

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VITAMIN A. Beth and Hans von Euler. *Svensk Kemisk Tidskrift,* September. The apparent connection between the growth promoting properties of corn, peas, carrots, tomatoes, beets, etc., and their carotin content has been subjected to further experimental tests. The fact that butter and blood serum contain vitamin A gives some indication of its fate in animal metabolism. The evidence of relation between carotin content and vitamin A activity is not yet conclusive; but use of the Carr-Price modification of the Rosen-Heim-Drummond calorimetric determination of vitamin A (with $SbCl_3$) has revealed a new parallelism which supports the idea that carotin is or contains vitamin A. A question still to be settled is whether or not the oxygen carrier property of vitamin A is significant in connection with its relation to the carotinoids.

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SOY BEAN OIL. M. Neumunz. *Oil & Fat Industries,* October, pp. 285-7. Extraction methods in the Far East are compared with European practice. Pressing the oil is the prevailing method in Japan and Manchuria, whereas European producers tend more to take advantage of the fact that soy beans are one of the few materials which can be treated successfully and efficiently in a chemical extraction plant. American made equipment used in the Orient includes vertical automatic continuous cookers, elevator separators with magnetic separator attachment, attrition mills, crushing rolls, box presses, plate filter presses and power cake strippers. Illustrated.

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VITAL ELEMENTS. John E. Rutzler. *Oil & Fat Industries,* October, pp. 295-301. An effort is made to show how the

five elements assigned to the five nutritional factors may be responsible for the effect of the corresponding vitamins in men and animals. The factors and their elements are: Pigmentation, Fe; growth, Mn; cell membrane formation, Ca; P and the Ca/P ratio; nutrition, Zn; anti-sterility, I. The case for Zn is admittedly weak; evidence for the others is considered satisfactory. Relations of these food factors and their significant elements to fat solubility and other matters of interest to the oil and fat industries are briefly considered.

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EXPERIMENTAL BAKING TESTS. M. J. Blish et al. *Cereal Chemistry 4,* 291-9, 299-310; *5,* 158-61; *Experiment Station Record,* October, pp. 590-1. Principal points to be considered in the standard experimental baking test are: How to judge fermentation tolerance in a single baking test, and how to allow for complications introduced by the strong oxidizing agents commonly added to flour and bread. Since fermentation tolerance depends largely on the gas production factor (diastase), crust color under properly controlled conditions can be used as a criterion. For oxidizing agent effects, a differential test, using $KBrO_3$ or the like in comparison with a test without added oxidizing agent, is recommended. Two committee reports on the standard test are given. These include the committee's fixed standard procedure recommendation and a statement of the formula and method to be employed in making the standard test.

* * *

FERMENTATION GLYCEROL. Y. Tomoda. *Chemical News,* Oct. 26, pp. 265-6. In comparative tests, it was observed that glycerol fermentation proceeds analogously to alcohol fermentation from start to finish. At a given total sulphite concentration the glycerol yield is directly proportional to the sugar concentration of the mash; at a given sugar concentration, the yield is proportional to the square root of the sulphite concentration. From this, a calculation is made, and a mathematical formula is stated, for the most economical concentrations of sugar and sulphite. The equation contains factors allowing for the cost of each as part of the calculation. Glycerol formation in the fermenting mash is favored by presence of aldehyde-sulphite compounds, and by addition of enough bicarbonate to make the medium alkaline.

* * *

OLIVE OIL. K. H. Bauer and J. Mitsotakis. *Chemische Umschau,* Oct. 24, pp. 275-7. In a study of the fatty acids characteristically present in olive oil, it was found that lignoceric acid is present in oil extracted by CS_2, but not in the pressed oil. The study is being extended to other oils, in comparison of the bisulphide extracted with the pressed oils, to ascertain whether or not the presence of lignoceric acid is characteristic of bisulphide extracted oils. It is considered probable that a test for ascertaining whether a given oil sample is pressed or extracted can be based on this peculiarity, at least for the analysis of commercial olive oils.

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YEAST CULTURE. H. Claassen. *Zeitschrift fur angewandte Chemie,* Oct. 20, pp. 1161-3. The Wohl-Scherdel rule, that 10-50 per cent of the N ordinarily supplied to yeast in malt nutrient can be replaced by ammonia N without loss in yield or quality, has been tested by experiment. German practice puts much faith in this rule, and proceeds accordingly. In a trial the yeast was supplied with 1.5 times the necessary N as malt (organic) N, and with an equal amount of ammonia N. Even with this large excess, there was a 14 per cent loss in the yield of yeast. At 40 per cent substitution of ammonia N for malt N the yield loss was 26.5 per cent. The Wohl-Scherdel rule holds only at the optimum N concentration and not when an excess of N is supplied. The relations for quality of yeast produced are similar to those for yield. Particularly in the range from 20 to 40 per cent substitution of ammonia N for organic N, the yeast produced is rated only as an inferior baking yeast. In spite of the fact that the Wohl-Scherdel rule is valid within a certain narrow range, it should not be accepted as a useful rule to be followed in actual production.

· GOVERNMENT · PUBLICATIONS ·

Documents are available at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated pamphlet is free and should be ordered from Bureau responsible for issue.

Competitive Conditions in Flour Milling. Preliminary report of the Federal Trade Commission under Senate Resolution No. 163, 68th Congress, 1st Session. 25 cents. The original printing of this pamphlet was in 1926. The new printing merely makes the document again available to those interested.

List of Technical Workers in the Department of Agriculture and Outline of Department Functions, 1928. Department of Agriculture Office of Personnel and Business Administration Miscellaneous Publication No. 32. 20 cents. A convenient reference index to the Federal department staff, both in Washington and that scattered at the numerous field stations throughout the country.

What to Do in Case of Accident. Public Health Service Miscellaneous Publication 21. 15 cents. A pamphlet that affords in convenient form first-aid instructions that should be readily accessible in all plants and laboratories. The pamphlet is a logical item to be included in all first-aid cabinets.

Soft Drink Standards. Mimeographed statement from the Department of Agriculture, dated November 15, defining: Ginger Ale, Ginger Ale Flavor, Ginger Ale Concentrate, Sarsaparilla, Sarsaparilla Flavor, Cinnamon Extract, Cassia Extract, Cassia Cinnamon Extract, Oil of Cinnamon, Oil of Cassia, Oil of Cassia Cinnamon, Ceylon Cinnamon Extract, and Oil of Ceylon Cinnamon.

Mayonnaise Standard. Mimeographed statement from the Department of Agriculture, dated November 15, defining and giving specification for mayonnaise, mayonnaise dressing, and mayonnaise salad dressing.

Grain and Meal Specifications. U. S. Department of Agriculture Supplement No. 2 to Food and Drug Service and Regulatory Announcements No. 2, gives definitions and standards for vegetable products as follows: Purified middlings, seminolina, and farina.

Cheese Specifications. U. S. Department of Agriculture Supplement No. 2 to Food and Drug Service and Regulatory Announcements No. 2, gives definitions and standards for animal products as follows: Pasteurized cheese and emulsified cheese.

Membership Relations of Co-operation Associations (Fluid Milk). Department of Agriculture Circular 41, 5 cents.

Harvesting Grain Sorghums, by John H. Martin, L. H. Reynoldson, B. E. Rothger, and W. M. Hurst. Department of Agriculture Farmers Bulletin 1577. Information is given regarding various harvesting methods that may be valuable to sorghum sirup manufacturers and others whose harvesting problems are similar in nature.

State and Insular Public Health Authorities. Directory for 1928, with data as to appropriations and publications. Listed in Public Health Reports, Volume 43, No. 44, November 2, 1928. 5 cents.

New Food Specifications. New or revised specifications have been announced by the Navy Department governing its purchases of a number of items used for foods. In general these requirements of the Navy are identical with the United States Government Master Specification which applies to procurement of the corresponding commodities by all government departments. The new specifications with the Navy specification numbers are as follows: Canned bacon, 56B2c; Smoked sweet pickled bacon, 56B28d; Canned corned beef, 56B8d; Canned sliced dried beef, 56B25e; Wheat flour, 56F11b; Smoked sweet pickled hams, 56H7c; Headcheese, 56C3e; Beef hearts, 56H4d; Beef kidneys, 56K1d; Beef liver, 56L2h; Luncheon meat, 56L7c; Pork, 56P8g; Bologna style sausage, 56S14f; Frankfurter style sausage, 56S24d; Pork sausage, 56S6f; Canned Vienna style sausage, 56S21g; Canned beef tongue, 56T7; Veal, 56V6c.

· CRITICAL · BOOK · REVIEWS ·

PATENT LAW FOR THE INVENTOR AND EXECUTIVE. By H. A. Toulmin, Jr. New York: Harper & Brothers. Pp. 288; price $4.

As F. A. Scott maintains in an introduction to this treatise, no statistics exist that tell the whole story of American patent experience. How many patents have failed to return to the inventor a just reward; what volume of tribute has been collected by holders of patents that could not have been sustained had anyone felt sufficiently interested to contest them—such details can never be known. That the total volume of maladjustment and injustice has been appallingly great is recognized by every executive whose experience has carried him into the field of patent law. A more intimate knowledge of the subject is the first requisite toward emergence from this unhappy situation. How to acquire such knowledge as an incident of a crowded business or professional career is a part of the problem of many executives.

Colonel Toulmin is the author of an interesting and helpful volume, parts of which have already appeared in the form of magazine articles, in publications such as *The Magazine of Business, Chemical and Metallurgical Engineering, American Machinist,* and *Electrical World.* An introductory chapter on "How to Get a Valid Patent" is followed by advice to the effect that executives should engage the services of patent attorneys before complications have arisen. The big fees earned by lawyers are for litigation that could have been avoided at slight expense, it is maintained.

The author sees no escape from pitfalls by relying on trade secrets rather than on patents, and his arguments in this connection are unanswerable. Chapter IV will be of immense value to inventors, describing, as it does, a complete system of invention records. Subsequent sections of the book discuss "Purchase and License Agreements," and "Who Owns the Invention—the Employer or the Employee?" This leads naturally to the problem of stimulating the flow of new ideas from plant operators. The practice of the Postal Telegraph Company is of interest. "All of our employees," says one of its executives, "from the highest to the lowest, are encouraged to invent improvements in mechanical apparatus used by the company, and every facility is afforded for this purpose. Whenever an employee produces an invention, he submits it to the chief engineer, who decides if it is of any use to the company, in which event the invention is patented at the company's expense. In consideration for this, the company exacts from the employee-inventor a one-half interest in the patent, but the company agrees that its interest shall be limited strictly to the use of the invention by itself and its affiliated companies. In other words, the company has no right to sell the invention, but only to use it in its own business. If the company, through its chief engineer, decides not to have the article patented, then the employee-inventor is free to do so at his own expense and the company has no interest in the invention. We consider," concludes the statement, "that the product of the employee's brains, while he is on the company's time and making use of the company's plant, belongs to the company to the extent indicated. But the employee-inventor is free to market his invention anywhere else he is able to do so, even to our competitors."

Testimony from those who have introduced a regular invention department for the encouragement of employees is given, which should be helpful to those who have not yet taken advantage of this method of stimulating interest in the work. In subsequent chapters are discussed the methods by which patent infringement may be avoided, the worth of patents and the relation of patents to income-tax return. The author points out the anomaly that exists whereby the law of the land gives an inventor a monopoly on the one hand, by granting a patent, and denies him the fruits of his labor, by the enforcement of the Sherman Act, on the other. Patent pools and patenting in foreign countries form the subject of separate chapters, and the book concludes with an appendix in which is summarized the value of patents and copyrights in the hands of the leading industrial organizations.

A. W. ALLEN.

* * *

THE NEW WAY TO NET PROFITS. By Fred W. Shibley, Vice-President, Bankers Trust Co., New York. Harper Brothers: 206 pages; price, $3.00

This latest book on the science of business is a practical treatise dealing with the making of net profits in business and industry. As a result of the financial crisis succeeding the short period of industrial activity immediately following the war, Mr. Shibley, who for many years had been a student of industrial management, found himself faced by the solution of many problems involved in his studies of making American business pay its way. In his close association, in a practical way, with the reorganization and reconstruction of a number of businesses subsequent to the period of business adjustment in 1920 and 1921, it began to become apparent to him and others working with him along the same lines that if net profits were to result, old methods starting in production must be reversed and manufacturing output must be controlled by the amount of output which could be sold by any one company. Mr. Shibley's book describes the system of forecasting sales which was devised to accomplish this purpose, and the plant operated in connection with such a forecast.

The appeal of the book's contents should be a wide one. Manufacturers, merchants and bankers will find here information of great value in the solution of their special problems. It describes a plan of action which is simple and practical, plentifully illustrated with concrete cases of successful results.

The book opens with a chapter on "Why the New Way Was Found Necessary," in which the fact is established that the present is the day of the thinker, the philosopher in industry. The "New Way" is then discussed in detail as pertaining to market study, merchandising, distribution, sales forecast, production, planning, budgeting control, management, research and analysis. The underlying theme of the whole book is "success in business," but for success the business man must co-operate with his fellow men in business in order that there shall be co-ordination of thought and effort in the business of the nation. The individual business man will be most successful when the greatest number of his fellow-men are successful.

R. M. DAVIS.

* * *

FRUIT PECTIN. By William A. Rooker, including a chapter on patents on the manufacture and use of pectin by Milo A. Daughters. Avi Publishing Company, New York, 1028. Price $6.00.

In a volume of 170 pages the two authors have gathered and integrated a large amount of the existing knowledge of the manufacture of pectin. No attempt has been made to cover the whole field of pectins for quite early in the book Mr. Rooker points out that the pectins of citrous fruits are not to be covered by his discussion. However, the field of apple pectin recovery, in which the author has had much experience, has received a quite comprehensive discussion. The author has confined himself to subject matter with which he is actually familiar by virtue of experience and for this he is to be complimented.

A wealth of manufacturing details are presented, for the larger part, in the language of the chemist or chemical engineer. The steps in the manufacture of pectin solutions and methods of bottling and producing powdered pectin are given. The commoner uses of pectin in jelly and preserve manufacture are discussed in detail, with a chapter devoted to the chemistry of jelly-making. Also there is a chapter on some of the newer uses of pectin as an emulsifying agent, in the confectionery trade, fountain syrups and as a blood agglutinant.

Forty pages are given to patents on

the manufacture and use of pectin in which the salient features of the several processes are quoted, although none of the patent claims are given.

As a piece of writing the first fourteen chapters leave much to be desired. Incomplete sentences abound, such as the following from page 56, "Say four or five 100 pound sacks." Similar errors occur with aggravating frequency and, while their importance is not so great as to preclude the reader from comprehending the author's meaning, they interrupt the thought that should flow smoothly on. The word inherit is used for inherent on page 38; tar is used for tare on page 84; the figures 0.8 and 2.0, without indicating that they are per cents, are found on page 53. On page 66 one wonders whether extra heavy charcoal tinplate is Charcoal A or Charcoal B plate. It would have made the explanation of testing the acidity clearer to state on page 58 what indicator should be used.

The book will prove to be valuable to all pectin manufacturers. Preservers, jelly makers and others in related lines will find the book full of valuable information. L. V. BURTON.

* * *

THE ARTICHOKE. By A. W. Bitting, M.D.

Doctor Bitting has written a 35-page booklet on The Artichoke, giving its history, distribution throughout the world, culture, uses and composition. Methods of preparation for the table, and for canning, are described fully.

The booklet is a reprint of a series of articles which appeared in *The Canning Trade* in 1928.

"Importance of Five Leading Speculators" is an interesting sub-title of Technical Bulletin No. 79-T, "Major Transactions in the 1926 December Wheat Future," by J. W. T. Duvel and G. Wright Hoffman of the U. S. Department of Agriculture. The conclusion is reached that "without the accumulation of long or short lines of millions of bushels by a few leading speculators the major swings in price would not have been so large."

The bulletin declares that it is established that large scale trading of speculators directly relates to price and to a marked degree.

· SELECTED · PATENTS ·

BOTTLE WASHING APPARATUS

I. R. Hippenmeyer, Waukegan, Ill., assignor to the Creamery Package Mfg. Co., Chicago, Ill. No. 1,684,827. Sept. 18, 1928.

Dirty bottles, in a series of parallel rows on a conveyor, are introduced into the machine where they fall into inclined slots. The slots are carried in a series of wheels that revolve in each of several compartments. The revolution of the wheels carries the bottles down and submerges them in the solution in the tank below. It then elevates them to a draining position and finally carries them to a hole in the partitions where another has its slots in registry with those of the previous wheel. From this point the bottles slide to the next position and receive another treatment.

By this means the successive operations of soaking in several hot solutions, rinsing, sterilizing, and cooling are performed on a continuous line of bottles.

PROCESS AND APPARATUS FOR CLEANING BERRIES

Joseph W. Sawyer, of Millbridge, Minn. No. 1,681,627. Aug. 21, 1928.

When blueberries are placed in water the tendency is for sound ripe berries to sink while those unfit for canning or cooking will float, together with any twigs, leaves or similar foreign matter. The observation has been made that occasionally some of the good berries will also float due to the adhesion of air bubbles to the fruit.

Sawyer has discovered that water heated to about 115 deg. F. prevents this abnormal flotation because the bubbles do not adhere so tenaciously at this temperature as at lower ones and his apparatus and process are based on this fact.

A tank is equipped with an inclined elevating conveyor leading up out of it. In the tank are heating coils and outside is a circulating pump that will produce a current of water in the tank, thus helping to dislodge the troublesome air bubbles that might make an improper classification of the fruit. A hopper within the tank directs any berries which sink in the water to the elevating conveyor. Skimming off the undesirable floating material is done by hand or by any suitable mechanical skimmer.

PROCESS FOR PRODUCING LIPASE

Shozo Yamamoto, Osaka-Fu, Japan. No. 1,687,050. Oct. 9, 1928.

According to Yamamoto vitamin A can be absorbed by the stomach and intestines only when oil or fat containing this vitamin is completely digested and therefore individuals whose physiology may be deficient in lipases will require the addition of this substance in order to obtain the best results from their food.

In this invention refuse from castor beans or soya beans is mixed in water and fermented at a temperature from 30 deg. C. to 40 deg. C. for a week or more. After a separation of the liquid from the insoluble substances, lipase is recovered from the liquid section by precipitation with acetic acid, evaporating at a low temperature. A concentration of lipase to 700 times the original concentration is claimed as the result of this method of treatment.

FILLETING FISH

Rudolph Baader, Lubeck Germany. No. 1,687,922. Oct. 16, 1928.

Decapitated fish are set into the filleting machine on a reciprocating carriage, which carries the fish through a series of stations at which are located rotary knives, and by a cam motion the dorsal, fins, and other objectionable portions of the fish are excised.

KNEADING MACHINE

Erland F. Peterson, Everett, Mass., assignor to the Goudey Gum Company, Boston, Mass. No. 1,683,051. Sept. 4, 1928.

This machine, although adaptable to confectionery, cake and biscuit dough, is particularly designed for use in kneading and rolling chewing gum. Its principal parts are a helical kneader, somewhat like that employed in meat grinding, and a rolling device.

A feature of the kneader is its prevention of churning of the plastic mass. This is effected by a pair of plungers that alternately press the mass into contact with the helical center of the machine, an operation that, in turn, has the important effect of causing the material, in the form of a continuous mass, to be extruded through a rectangular discharge opening. During the period when the plungers are elevated the hopper may be charged with fresh material.

An additional feature of the machine is its device for dusting the rolls and belt that perform the operations next in sequence, those of rolling the plastic mass to proper thickness and carrying it away.

CURING MEATS

Eugene T. Drake, Omaha, Neb., Assignor to the Cudahy Packing Company, Chicago. No. 1,685,630. Sept. 25, 1928.

A process of curing meats with absolutely predetermined control. By cure is meant the biochemical combination of haemoglobin with nitrite to produce a red color. In this process nitrite is used together with a species of denitrifying bacteria. Two possible methods are given: (1) Sterilized nitrite pickle, producing only a nitrite cure; (2) Unsterilized pickle that effects both the cure and an improvement of the flavor.

The culture is prepared by growing the proper bacteria in a solution of 2 to

8 per cent of sodium nitrite; ½ to 20 per cent of sugar; ½ to 17 per cent of salt; containing protein material including amino nitrogen from 0.05 to 2 per cent, such as peptone or sterilized second pickle containing meat juices. The pH is adjusted between 5 and 10. Sterilization is by heat at not lower than 75 deg. C. (See U. S. Patent No. 1,259,377.)

The bacteria are denitrifying bacilli or spirilli, not previously isolated or classified. (See U. S. Patent No. 1,259,377, 1,380,068 and 1,380,070 for their culture and isolation.)

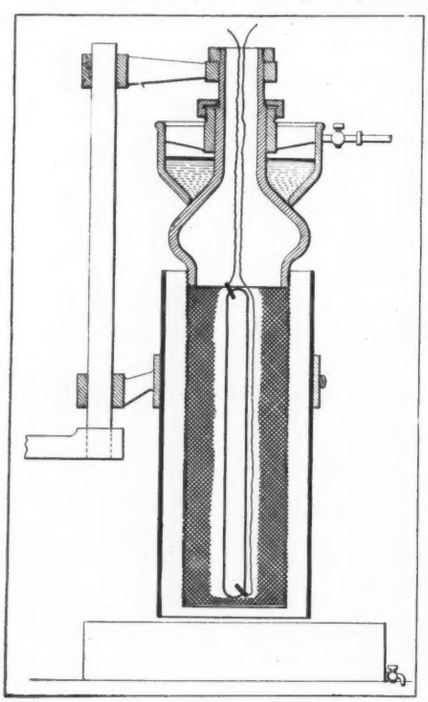
Cultivate 24 to 36 hours between 70 and 110 deg. F. oxygen being supplied aeration. One per cent of this culture is used for inoculation of a second culture twenty times as large and in turn a third culture is inoculated by the usual steps for building up a large volume of culture, requiring about six days. The latter is the final pickle for curing the meats.

An enormous economy is stated to be possible by the use of this pickling process through the shortening of the time required. Residual nitrites are decreased. It is also stated that the pickle may be evaporated to dryness and applied superficially, with excellent curing results.

Treatment of Milk with Ultra-Violet Rays

Frank Hoffmann, of Vienna, Austria. No. 1,681,538. Aug. 21, 1928.

Irradiation of milk is carried out in this invention for the purpose of increasing vitamin content and sterilizing. In most attempts to carry out the process the problem has been to obtain the milk in very thin films accessible to the ultra-violet rays. Hoffmann allows the milk to trickle down a cylindrical grid or sieve with a quartz lamp suspended in the interior. A shield is provided to exclude free circulation of air and thus reduce ozone formation which is undesirable for milk. Provision is also made to displace the air in the apparatus by an inert gas.



Milk irradiation device

Liquid Coffee Extract

Frank L. Slocum and William E. Trautman, Pittsburgh, Pa., assignors to Magic Coffee Co., Pittsburgh. No. 1,687,112. Oct. 9, 1928.

A process patent relating to the production of a liquid extract of coffee which will be instantaneously soluble in either hot or cold water.

The method consists in percolating coffee which has been properly roasted and ground with cold distilled water at temperatures below 15 degrees C. The method of extraction is somewhat akin to the method used in extracting sugar juices from the cane in sugar mills. The essential steps of this invention are the fractional percolation of the coffee divided up into a number of separate containers using the more dilute extracts to percolate a more concentrated or less extracted lot of coffee. In this way, by gradual steps, a very concentrated extract is built up.

It has been found that if roasted ground coffee is mixed with one-half to three-fourths of its weight of water, that an energetic chemical action will occur which is detrimental to the flavor and taste of the coffee and is brought about by the heat generated by this action, for caffeol is very easily decomposable at low temperatures. In this process the temperature of the coffee is not allowed to rise above 15 degrees Centigrade and the whole apparatus is arranged so that oxygen is excluded which also has a deleterious effect upon the caffeol.

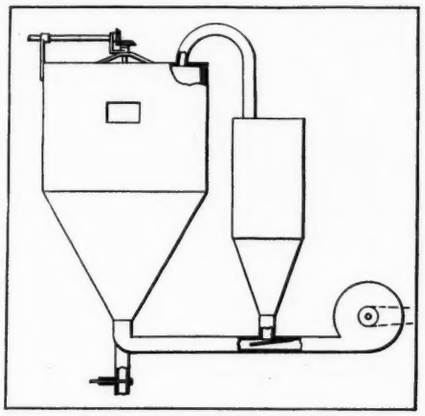
The concentrated extract is hermetically sealed in some kind of container and sterilized at a temperature of about 105 degrees Centigrade for approximately 30 minutes, and produces a product which will keep for any desired length of time. Coffee is prepared from the extract by dissolving it in water.

The spent grounds taken from the percolator are used for the production of grease by extraction with a suitable solvent and the residue is then used for fertilizer purposes.

Vitamin Generating Apparatus

Francis C. Beardslee, of Los Angeles, Calif., assignor to said Beardslee, B. M. Huffine and J. I. Huffine, Joint Trustees, of Los Angeles, Cal. No. 1,682,318. Aug. 28, 1928.

Food stuffs, particularly poultry-feed, although food for humans is also mentioned, may be irradicated by ultra-violet light to increase or to create vitamins of the antirachitic type in this apparatus.



Vitamin generating apparatus

Essentially the device consists of two cylindrical tanks with hopper bottoms and a blower together with a source of ultra-violet light. The delivery pipe from the blower passes below the first tank and into the second tank at its bottom. Its connection with the first tank is such that it exerts an aspirating effect and sucks out food from the vessel and blows it up into the second tank. The air escaping from the latter is led out at the top and back into the former at its top. The purpose of this arrangement is to keep the food in the second tank in a state of constant agitation and any food particles carried away in the escaping air are thrown down again in tank No. 1.

A further mechanical feature is that a wiper revolves inside the second or irradiating tank that constantly cleans its interior surface because the surface is polished metal and polarizes the light.

The ultra-violet light is obtained from any suitable source outside and passes into the tank through quartz windows set flush with the interior of the tank.

Preparation of Yeast

Gustav O. W. Heijkenskjold, Stockholm, Sweden, assignor to Aktiebolaget Bästa, Stockholm, Sweden. No. 1,680,043. Aug. 7, 1928.

A means of converting the carbohydrates found in sulphite liquors obtained from the manufacture of wood pulp into a foodstuff in the form of yeast.

In addition to sulphuric acid, sulphite waste liquors contain about 2½ per cent of sugar and 12 per cent of other organic substances. These are neutralized, preferably by ammonia and powdered limestone. After neutralization, a period of sedimentation occurs and then filtration through malt sprouts. Malt sprouts are preferred because they add something to the clarified liquor which later helps the growth of the yeast. Other substances to promote growth are added.

An important part of the procedure is the preparation of the inoculum for starting the fermentation, accomplished by placing a relatively small amount of the sulphite liquor in molasses, in the

initial fermentation. Due to the rapid initial cultivation, the yeast cells are in full work when added to the sulphite liquor and are then able to assimilate the sugar in that liquor and resist the toxic effect of the sulphite.

During fermentation, air is blown through the fermentation tank so that the development of the yeast is stimulated and practically no alcohol formed. It is considered highly important that the seed culture of yeast be "supernourished" and the nitrogen content ought to be brought up beyond 2½ per cent of the seed yeast.

Producing Diastatic Products

Keizo Wooyenaka, Tokyo, Japan, and Tatsuo Okochi, Clifton, N. J., assignors to Takamine Ferment Company, New York, N. Y. No. 1,680,926. Aug. 14, 1928.

The present process is an improvement upon Patent No. 1,263,817. Bran, as a cultural medium, is introduced into a drum to a depth of three or four feet, then sprayed with an antiseptic solution consisting of sodium salicylate, sodium fluoride and water after which the contents are mixed by slow rotation. Steam is now admitted to the drum to sterilize the contents. After about 1½ hours the drum is cooled by blowing conditioned air through it. The contents are then sprayed with dilute hydrochloric acid although other acids may be used. Further cooling is the next step after which the sterile culture medium is sprayed with a water suspension of spores of *Aspergillus oryzae*. The drum is kept revolving at an extremely slow rate and warm moist air is blown through it to remove carbon dioxide. Growth is generally complete in from 42 to 48 hours. Directions for the preparation of the spores and their preservation in viable condition are also given.

The product has a diastatic strength of from 6,000 per cent to 12,000 per cent measured on the Lintner scale and is double the strength of any product previously produced. By growing the mold in the presence of the antiseptic, the element of possible failure has been eliminated.

PRACTICAL · OPERATING · DETAILS

New Application of Dry Heat in Cereal Production

By Grace Kirkpatrick
Spokane, Wash.

A new method of applying dry heat in food production has been developed by a western cereal manufacturer, and machinery that is entirely original, nothing operating on the same principle being in use anywhere in the United States, has been installed. The Dina-Mite Food Company of Spokane, Washington, Ren H. Rice, proprietor, have for several years been marketing a cereal with a wheat basis. Their new food, Dina-Oats, is a meal similar in nature but using oats instead of wheat. It required different handling and for its preparation the new method of production has been introduced, and for the first time, it is believed, gas is being used in this particular way in the manufacture of such a product.

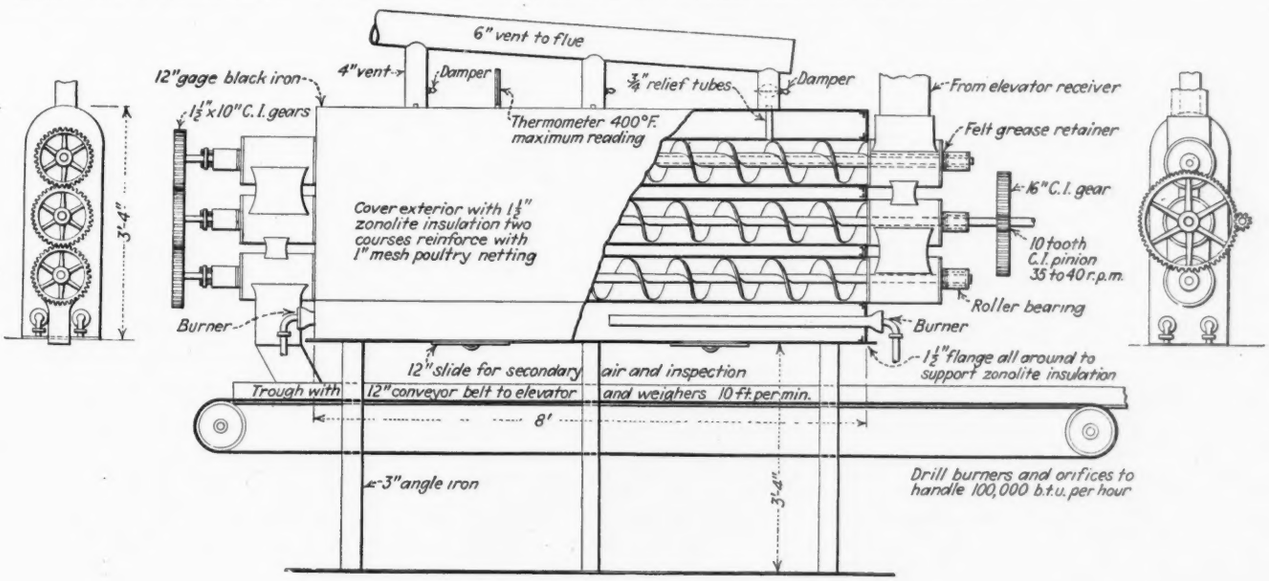
It was not desirable to pre-cook the meal, as can be done so well with steam, but the company did wish to apply intense heat at severe air pressure. Steam could not be used, because no matter what precautions were taken some was bound to escape into the room, and dampness was ruinous to the product.

"I tried all over the United States to obtain machinery which would meet our purpose," said Mr. Rice, "but could find nothing. A suitable one had to be built. Accordingly we now have apparatus that is original with us, but which is operating so successfully that already a Los Angeles factory has ordered a machine identical to the one we are using to be made here and shipped to California.

"As far as is known this is the only machine of the kind using dry heat under heavy pressure. It takes all the moisture from the grain and also expands the cells so that three minutes of boiling, in preparing the finished food for the table, will now be equal to fifteen minutes under the old system of producing our wheat product. Thus a former objection to the food has been removed."

The intense heat is supplied by a series of ingeniously designed gas burners which give a uniform temperature to all the cylinders. This part of the equipment was made under the direction of William A. Moore, the engineer for the Spokane Gas Company who, together with Mr. Rice, worked out the entire system of installation. The heat is applied while the previously ground grain is in a series of steel cylinders that vary in size and are equipped with spiral steel conveyors. The cylinders are mounted horizontally, and the moisture is removed and the grain cells expanded while the conveyors are forcing the product along. From the conveyors the meal falls to a carrier belt. This is employed to allow the intensely hot grain an opportunity to cool, so as to insure better preservation, before it reaches the storage tank from which it is packed.

One of the main difficulties of adjustment was to find the rate of speed that the cereal could travel and not scorch, and still allow for sufficient volume to meet the needs of production. The blue print shows the arrangement of shafts and pulleys and gears that finally solved the trouble.


6" vent to flue
12" gage black iron
4" vent
Damper
⅜" relief tubes
Damper
From elevator receiver
1½" x 10" C. I. gears
Thermometer 400° F. maximum reading
Felt grease retainer
16" C. I. gear
Cover exterior with 1½" zonolite insulation two courses reinforce with 1" mesh poultry netting
10 tooth C. I. pinion 35 to 40 r.p.m.
3'-4"
Roller bearing
Burner
Burner
1½" flange all around to support zonolite insulation
12" slide for secondary air and inspection
Trough with 12" conveyor belt to elevator and weighers 10 ft. per min.
8'
3" angle iron
3'-4"
Drill burners and orifices to handle 100,000 b.t.u. per hour

Cereals are dry cooked under air pressure in this apparatus

MANUFACTURERS' · NEWS · AND · EQUIPMENT

Five unit automatic holder pasteurizer

Five Unit Automatic Holder Pasteurizer

A continuous flow of milk is automatically pasteurized by the holder method in the new Pfaudler Five Unit Holder Pasteurizer which is shown in the accompanying illustration. The warm milk is drawn into the several tanks by means of vacuum and blown out by compressed air after suitable holding.

The cycle of operations in each of the units is successively performed through the action of a master valve which controls air and vacuum pipes to the several units. From a tank known as the balance tank, where a constant liquid head of milk is maintained, the milk is pumped successively through the heaters, the filters and into a second balance tank. The warm milk at pasteurizing temperature is then drawn into the insulated holder units by vacuum, held for thirty minutes, and automatically discharged. No additional heat is required although steam may, if desired, be introduced into the air space over the milk in the units. Dead ends are obviated by means of a pipe within the filling line, so arranged that irrespective of which unit is being filled the milk must circulate throughout the length of all pipes.

Waterproof Paper

The Hudson Bag Company, Brooklyn, and its affiliated company, The Moore & Thompson Paper Company, Bellows Falls, Vt., have marketed a waterproof paper named "PAK."

This paper has been developed to meet the demand for a waterproof sheet possessing both flexibility and strength, that at the same time is odorless and tasteless, such as would be required for a food product susceptible to absorption of foreign odors.

Insulated Containers for Refrigerated Meat

Three and one half tons of refrigerated meat may be shipped without ice in the new insulated containers used by an English railroad, according to the U. S. Department of Commerce. Chilled meat received in refrigerator ships at Southampton is loaded into the containers and hoisted out of the hold by derricks and transferred to trucks or cars for shipment to London where motor trucks carry them to Smithfield market.

Insulation of doors and walls is by cork, while the floor is insulated by asbestos sheets. Air tight fittings prevent loss of heat by air currents and an even temperature is preserved. Designed primarily for meat the containers are used for other perishables.

Motor Driven Signal

A one-tone signal, said to be audible at a distance of a quarter of a mile, is offered by the Benjamin Electric Company, Chicago. It is driven by an electric motor and is particularly intended for use in noisy industries. Both single and double horn projector types are offered. The double horn type with its horns projecting in opposite directions is suitable for projecting signals up and down alleys, corridors and platforms.

Motor driven signal

Commercial Methods of Increasing Vitamin D in Foods

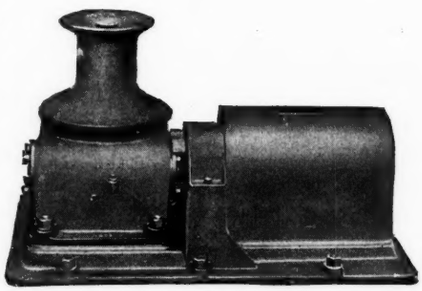
To inform our readers about possible commercial methods or processes available to food manufacturers for increasing the vitamin D content of foods, the following information is given. Owing to the restrictions surrounding licensees under some of the patents, together with the complexities of the legal and business aspects involved, the statement is reduced to a bare recital of what are believed, but not guaranteed, to be facts.

1. The Steenbock patent, granted Aug. 14, 1928, to Professor Harry Steenbock of the University of Wisconsin, has been assigned to the Wisconsin Alumni Research Foundation, 1041 The Rookery Building, Chicago.

2. The MacChesney (also called the Chesney) patent, is controlled by the Solar Research Corporation, in care of the Quinlan Company, 35 Wacker Drive, Chicago.

3. The Paccini patent, granted Aug. 14, 1928, is understood to be controlled by Charles M. Richter, 36 South State Street, Chicago.

According to rumor there are other methods that may be soon available.



Capstan Car Puller

The Weller Manufacturing Company, 1820 N. Kostner Ave., Chicago, have added two sizes of electrically operated upright capstan car pullers to their line of horizontal capstan and drum type car pullers. The smaller unit, C-1, will develop the full strength of 1¼-inch manila rope and will pull from one to three cars, while the larger unit, C-2, will pull from three to six cars. They are useful in spotting cars and save the time and heavy labor of a crew using pinch bars.

Concentrated Maple Flavor

True maple flavor in a highly concentrated form is offered by Fritzsche Brothers, Incorporated, according to their recent announcement. Its production is based on the public U. S. Patent No. 1,642,789 granted Sept. 20, 1927 to John W. Sale and John B.

Wilson working in the U. S. Department of Agriculture, and the process required approximately one year to work out after the method had been developed.

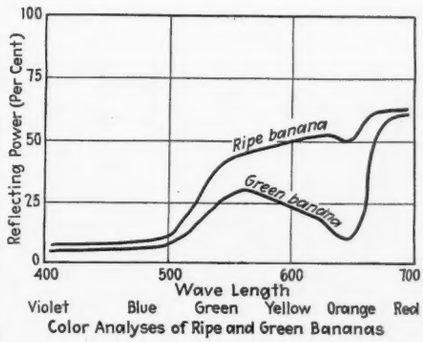
The flavor is obtained by removing the sugar by appropriate means, described in the patent, from pure maple sugar leaving only a dilute solution of the flavor containing very little of the original sugar. It is then concentrated by evaporation in a vacuum. Fifteen per cent of alcohol is added as a preservative. It is readily soluble in water and syrup and in its concentrated form is stated to be more than sixty times as strong as untreated maple syrup. Ice cream manufacturers and confectioners will be particularly interested in its availability.

Accurate Determination of Color Now Possible

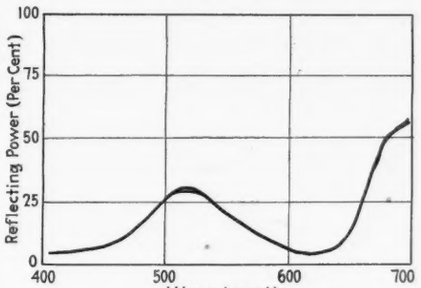
The exact duplication of any color at any time and at any place has been made possible by a new colorimeter developed by Professor Arthur C. Hardy of the department of physics at Massachusetts Institute of Technology, and described by him at the annual convention of the Optical Society of America, at Washington on November 1.

The new color analyzer, known as a recording spectrophotometer, eliminates human judgment entirely, and automatically measures the color and wave lengths of any substance rapidly and with precision. Not only does it measure color accurately but it makes a record by which it is possible to match that shade at any time, thus eliminating all possibility of fading of a standard color. Its commercial development is being carried on by the General Electric Company, to whom the patent rights have been assigned by Professor Hardy.

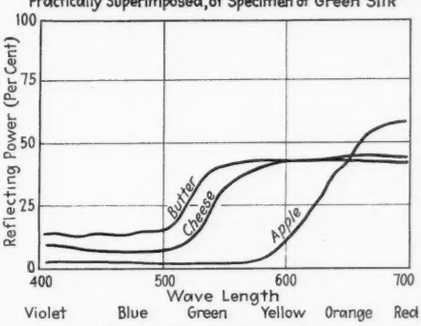
The importance of the new color analyzer lies in its value to industry in nearly every branch of which control of the color of its products is necessary for there is scarcely an industry without a color problem. Small differences in color may mean thousands of dollars in the sales of cottonseed oil. It is an established custom on the New York Produce Exchange for the buyer to demand an oil of amber hue. An oil which is slightly red sells for several cents per gallon less than the "prime" oil, although the difference in color may be so small that it would be scarcely noticed by the ordinary purchaser. The color of a product frequently is neither the most important nor least important property; it is simply one of the properties which many manufacturers attempt to control in order to please the buyer.



Color Analyses of Ripe and Green Bananas

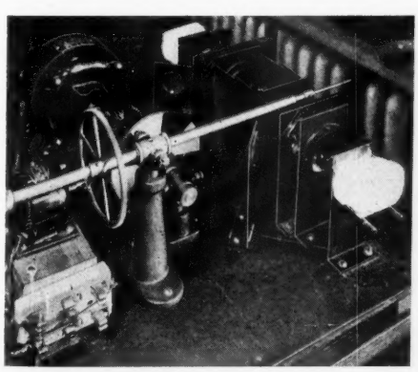


Reproducibility of Instrument, Showing Two Curves, Practically Superimposed, of Specimen of Green Silk



Typical Color Analysis Curves

Data tabulated from new colorimeter


Recording spectrophotometer

MANUFACTURERS' CATALOGS

Hoffman Automatic Unit Volume Storage System. Supplement No. 1. The Hoffman Heater Company, 1701-15 Dixie Highway, Louisville, Ky.—Large volume water heating by means of gas for industrial establishments.

Robertshaw Automatic Temperature Controllers. Catalog No. 5, Robertshaw Thermostat Company, Youngwood, Pa.—A complete line of self contained thermostats and temperature controllers for all industrial uses.

Fay Electric Floor Machines. The Fay Company, 11 East 31st Street, New York.—Machines for cleaning, scouring, sanding, waxing and polishing floors of wood, marble, tile, terrazzo, linoleum, rubber tile and other floor coverings. Capacity data given.

Hellige Comparators for Hydrogen Ion Determinations. Bulletin No. 406, Eimer and Amend, Third Avenue at 18th Street, New York.—A new comparator, making use of non-fading glass standards, for determining hydrogen ion concentrations.

Belt Conveyor Idlers. Chicago Automatic Conveyor Company, 1845 South 55th Avenue, Cicero, Ill.—Ball bearing idlers for belt conveyors.

Webster Series "78" Thermostatic Traps. Warren Webster and Company, Camden, N. J.—Steam traps for process steam at pressures from 10 to 100 pounds pressure, in industrial installations, also dirt strainers. Ratings and other data presented.

Safety Worm Gear Winch. Weller Manufacturiug Company, 1820 N. Kostner Avenue, Chicago.—Hand power, worm driven, self locking mechanism, winches with capacities from 500 lb. to 1,500 lb.

How to Isolate Machine Vibrations. —A discussion of materials for isolating machine vibrations with citations from technical literature, and methods of application of Korfund plates. The need of Isolating Machine Vibrations. Bulletin A.—Illustrating Korfund bases. The Importance of Isolating Vibration and Noise. Bulletin B. The Korfund Company, Incorporated, 235 East 42d Street, New York. — Excerpts from technical literature on effects of vibration and noise.

Absorbit, and Absorbophone. The Korfund Company, New York.—Sound and vibration deadeners for walls and floors.

Vibro-Dampers. The Korfund Company, New York.—Description of combination of spring bases for machines with Korfund isolating material.

Economy in Packing Plant Equipment. The International Nickle Company, Inc., 67 Wall Street, New York. —Applications of Monel metal to all phases of packing plant operations. List of sources of such Monel metal equipment is given.

Electrical Equipment, General Electric Company, Schenectady, N. Y. Publications as follows: GEA-61B, constant-speed, direct-current motors, 3 to 200 hp.; GEA-78A, crane and hoist motors, 2 to 15 hp., totally enclosed; GEA-153A, automatic switching equipment for waterwheel-driven generators; GEA-807A, the repair of armatures; GEA-844A, magnetic reversing switch for 1, 2, 3 phase motors; GEA-1057, single, double, triple pole oil circuit breakers; GEA-1059, two-frame and four-frame motor drives; GEA-482A, silent gears of fabroil and textolite.

· NEWS · ITEMS ·

Unfair Methods of Business Defined at Trade Conference

The trade practice conference of wholesale and retail grocers which was held in Chicago Oct. 23 is viewed by members of the Federal Trade Commission as one of the most useful and successful group meetings as yet sponsored by the commission. It was hardly expected that so many separate and conflicting interests could come to a harmonious understanding in such a short time. Yet the eighteen resolutions submitted before the conference were accepted with only a few minor objections all given in the spirit of constructive criticism. These rules, developed by the trade itself to eliminate unsound practices, define as unfair methods of business seventeen of the usual disagreeable features that are commonly met today such as: secret rebates, free deals, prizes, bribery, selling below cost, abuse of mass buying power, compulsion to take a full line, failure of wholesaler to fill orders and retailer to accept orders, substitution, drop shipments and the like.

A resolution provides "that grocery trade practice conferences held under the auspices of the Federal Trade Commission be a continuing organization to act for the progressive elimination of unfair and uneconomic trade practices in the grocery trade in pursuance and realization of the resolutions now and hereafter adopted" and further, that an executive committee be appointed to plan the action of each conference subject to its direction.

The organizations represented were: the American Wholesale Grocers Association, National Association of Retail Grocers, National Wholesale Grocers Association, American Grocery Specialty Association, National Food Brokers' Association, American Spice Trade Association, and American Chain Store Association. Commissioners C. W. Hunt and M. Markham Flannery attended for the commission.

Before the resolutions were discussed, Clark McKercher of the newly formed American Chain Store Association read a statement sounding a note of caution. The conference was, he believed, "an entering wedge, the advance guard of a general movement which, to succeed, must include all the national associations having to do with the manufacture, sale, and distribution of food products" only a few of which were represented. Therefore he advised that the conference be so conducted as to inspire confidence; that minority control or tendencies toward the assumption of arbitrary power over the industry be avoided. Mr. McKercher expressed the opinion that the discouragement of unfair practices by group action would be sufficient to correct almost all conditions which may be forseen, and stated the willingness of his association to co-operate, in accordance with these principles.

Meat Packers Elect Officers

W. W. Wood, formerly Executive Vice-President, was elected President of the Institute of American Meat Packers, Chicago, at the annual convention in Atlantic City. Other officers elected were F. S. Snyder, Batchelder and Snyder, Boston, Chairman of the Board of Directors; E. A. Cudahy, Jr., Chicago; John J. Felin, Philadelphia; J. C. Hormel, Austin, Minn., and A. T. Rohe, New York, all vice-chairmen; Henry Neuhoff, Neuhoff Packing Company, Nashville, Tenn., Treasurer; Thomas E. Wilson, Wilson & Company, Chicage, was re-elected Chairman of the Institute Plan Committee.

Coming Events

DECEMBER

3—Power Show, New York.
3-8—International Live Stock Show, Chicago.
4-5—Western Canners Association, Chicago.
4-6—Southern Association of Ice Cream Manufacturers, Dallas.
6—National Dairy Council, Chicago.
6—Michigan Canners Association, Grand Rapids.
11-12—New England Bakers Association, Hartford.
11-13—Kansas Association of Ice Cream Manufacturers, Kansas City, Mo.
11-12—Ohio Canners Association, Columbus.
13-14—Association of New York State Canners, Rochester.
18-19—Tri-State Canners Association, Baltimore.

JANUARY

3-5—Northwest Canners Association.
9—Florida Association of Ice Cream Manufacturers, Miami.
14-16—Ohio Bakers Association, Columbus.
16-17—New England Association of Ice Cream Manufacturers, Boston.
21 — Junior National Convention, American Society of Bakery Engineers, San Francisco.
21-23—New York Bakers Association, Buffalo.
21-25—Annual Convention, National Canners Association, Chicago.
21-25—Annual Convention, Canning Machinery and Supplies Association, Chicago.
21-25—Annual Convention, National Pickle Packers Association, Chicago.
21-25—Annual Convention, National Kraut Packers Association, Chicago.
21-25—Annual Convention, National Food Brokers Association, Chicago.
29-30—Ohio Association of Ice Cream Manufacturers, Youngstown.

FEBRUARY

19-21—Cake Conference, American Bakers Association, Chicago.
27-2—Canners League of California, San Francisco.

Important Decision Governing Sugar Content of Carbonated Drinks

The New York City regulation governing the sweetening of nonalcoholic carbonated drinks was recently held void by the New York Supreme Court, Appellate Division. The section invalidated reads in part:

Nonalcoholic carbonated drink or beverage as herein defined shall be deemed to be adulterated: (1) If when sweetened it contain less than 7 per cent by weight of sugar (sucrose) in the finished product, except dry ginger ale which shall contain not less than 5 per cent of sugar (sucrose). (2) If it contain more that 0.004 per cent by weight of saccharin or other synthetic sweetening agent in the finished product.

In the case at issue the defendant had sold carbonated drink containing no saccharin and sweetened with slightly less than seven per cent of sugar. The court called attention to the fact that the present regulation was shrewdly designed to require the use of so much sugar that it would be impossible to add saccharin without causing the beverage to be unpalatably over-sweetened and, on the other hand, the maximum limit of saccharin allowed by the regulation was insufficient to sweeten palatably. In deciding against the regulation the court stated:

The department has thus accomplished deliberately by indirection what it has been forbidden to do, and has practically made it impossible to use saccharin in carbonated beverages. Under the guise of regulation, there has been factual prohibition. There is no question here of the deception of the public. There are specific provisions in the sanitary code requiring statement upon the label when saccharin is used. The validity of these provisions is not here questioned, and their transgression is not here involved. The only issue here is whether there is justification for compelling a manufacturer of carbonated beverages to introduce at least 7 per cent of sugar into his product, if he uses any sugar at all. There is no consideration of health, safety, or public interest suggested to give such justification.

Pectin Litigation Not Yet Concluded

The victory of the Certo Corporation in the Certo-Armour case reported in the November issue of *Food Industries* does not yet end the differences of opinion nor litigation as to just who may

grant licenses to manufacture jams and jellies by the "Short Boil" process if powdered pectin is used. The legal fight just ended is reported to have been based on claims 1 and 2 of U. S. Patent No. 1,304,166, the so-called "Short-Boil Patent," which cover only the use of liquid concentrates of pectin, but it is said to have not contested Claims 3, 4, 5 and 6. According to information received by *Food Industries* the latter are to be adjudicated, and suits for accounting are to be instituted in the near future.

Australian Canned Fruit Industry In Trouble

At the present time the Australian canned fruit industry is facing a serious position, is the report of E. C. Squire, American Trade Commissioner at Sydney, Australia. Much more fruit is canned than is needed for Australian requirements and yet with an export bounty, of $0.36 per dozen cans of peaches, there is still a heavy loss on export, which, in Victoria, is reported to be between 14 and 16 cents per dozen. The trouble is that production of peaches, in particular, has far exceeded both consumption and export requirements.

The record production of 1928 of apricots, peaches and pears was 3,252,686 dozen cans as compared with 1,934,630 dozen cans in 1927. The home consumption of these Australian fruits is about 1,500,000 dozen cans, which leaves a large exportable surplus, particularly in the current year. A further depressing factor in the local markets of Australia is the simultaneously occurring glut of fresh fruits that has competed directly with the canned fruits. In addition to these adverse conditions there is a prospect of an unusually large pack for the coming season, amounting to an estimated 1,660,000 dozen cans.

Some of the factors which have militated against the profitable operation of the Australian canned fruit industry are as follows:

(a) The adverse sugar position.
(b) Increased cost of production.
(c) Increased cost of orchard requisites.
(d) Increased production and inability to market the surplus satisfactorily.

Of all these factors, the sugar position in Australia most seriously affects the fruit industry because, both on account of the duty on sugar and on account of the embargo against importation, sugar now costs $148 per ton as compared with the 1916 price of $85.70 per ton.

During the past few years the Australian federal government has allowed a large amount of Australian sugar to be sold to overseas competitors at $53.50 per ton, f.o.b., while the local canners and jam manufacturers have been forced to pay the higher domestic price. They hold the opinion that they should either be allowed to purchase their sugar at a price on a parity with world markets plus the duty of $45.44 per ton or else that they should be allowed to import their sugar requirements and pay the duty, neither of which is permitted. Owing to the fact that their exportable surplus is manufactured with sugar maintained at an artificial price level and must sell against foreign competitors who utilize sugar purchased in the world markets, they are at a decided disadvantage.

In 1916 Australia was marketing 33⅓ per cent more jam than her present total output. This serious decrease in jam production means that fruit growers have lost a good proportion of the former outlet for their fruit with the result that they are compelled to seek a higher price for the proportion that is now sold for canning. In 1912 the jam manufactured in the Commonwealth amounted to 85,800,000 pounds compared with 67,300,000 pounds in 1925-26.

It is stated that if the sugar position could be adjusted, one of the most serious obstacles to the profitable conduct of the canning and jam-making industries would be removed. This statement takes cognizance of the fact that during the past ten years wages have increased and that orchard requisites now cost more than formerly.

Dairy Exposition a Great Success

Between 10,000 and 11,000 persons attended the third annual Dairy Industries Exposition held in Cleveland, Oct. 15 to 20. Leaders of the industry described it as the most successful exposition in the history of the dairy products field.

The exhibition halls with an aggregate area of over 200,000 square feet were quickly leased last May when ninety per cent of the space was taken within a few hours after leasing was opened.

Concurrently with the exposition were meetings of the International Association of Ice Cream Dealers; International Association of Milk Dealers; and the Salesmen's Club of the Dairy and Ice Cream Machinery and Supplies Association. The Cold Storage Butter contest of the National Creamery Butter Makers was also held in conjunction with the exposition.

Hall of Dairy Industries Exposition at Cleveland

Dairy Show to Go to St. Louis

The National Dairy Show which recently held its exhibition of dairy cattle and dairy barn equipment at Memphis, Tenn., is understood to have agreed to exhibit annually in St. Louis for the next five years. The Dairy Show should not be confused with the Dairy Industries Exposition which was held in Cleveland this fall.

United Biscuit Company Merger

The United Biscuit Company of America has completed arrangements to acquire the Ontario Biscuit Company of Buffalo, the Hekman Biscuit Company of Grand Rapids, and the Quality Biscuit Company of Milwaukee.

Purchases Sharpless Company

The June Dairy Products Company, Inc., announces the purchase of the business of the P. E. Sharpless Company of Philadelphia, which it will continue to operate under the Sharpless name and brands. The P. E. Sharpless Company, established in 1838, is one of the largest and oldest manufacturers and distributors of butter, eggs and cheese in Philadelphia and, in addition, maintains branch warehouses at Atlantic City, Harrisburg and York, Pa. The June Dairy Products Company, in addition to their New York business, have been established for some time in Newark, N. J., and Miami, Fla. The officers of both companies will be Ned W. Bandler, president; M. S. Bandler, first vice-president; R. A. Scharfe, second vice-president; Louis C. Bandler, treasurer; Harold A. Oldryd, secretary, and Archie E. Bandler, assistant secretary.

Present Developments Indicate a Constantly Increasing Mechanization

By Paul Wooton
Washington Correspondent Food Industries

MORE PROGRESS in the application of machinery to the handling of food products will be made during the next few years than in any similar period in the past. This is the opinion of specialists at the Department of Agriculture. They base their opinion on the knowledge that an intensive effort is about to be put forward by the government to aid agriculture and that the food trades themselves realize resort must be had to machinery wherever it can be used to advantage. It is denied that the farmer and those handling his products in distribution are slow to adopt machinery. This is shown by the large sales that immediately follow the development of any new labor-saving device. This recent example is cited. When the British authorities took exception to the spray residue on American apples it was found that thorough washing was the only way by which the fruit could be made to meet requirements. Immediate recourse was had to improvised machines that since have been brought to high efficiency and generally adopted with the apple growers. Incidentally, most of the cost of washing, it develops, is being saved by the quicker and easier grading made possible when apples are clean. Growers of nuts and of other products in connection with which sizing and classification is necessary, always have been quick to adopt machinery for the purpose and at the present moment, for instance, the pecan growers are clamoring for the development of a sizing machine that will operate on two dimensions. These are straws that indicate to these observers the inevitable trend toward the use of machinery in reducing distribution costs, even as it has been the means of notable reductions in production costs.

Refrigeration Indirectly Aids Canners

Displacement of canned goods by fresh fruits and vegetables in certain quarters is expected by some of the food specialists here to be a blessing in disguise to the canning industry. In the future instead of concentrating sales efforts in great centers of population, the canners are expected to turn to the more out-of-the-way places in this country and abroad for their market. In the tropics alone, it is declared, the potential market for canned goods is particularly great. It will require some cultivation and some expense to establish distribution channels, but those who spend their entire time in the study of such problems are convinced that this is the case.

Orient Awaits Packaged Goods

The domestic market having become comparatively well cultivated by the present-day use of improved packaging methods, government experts believe that the food industry can now afford to devote more time to packing problems as applied to its foreign trade. It is thought that there are not any unsolved packing problems of major importance involved in the European trade. Following the natural workings of economic law, the European nations with high standards of living already constitute the largest outlet for American prepared foods.

The conviction is dawning upon the government's foreign advisors, however, that there is an expanding market in the Orient for American foodstuffs to supply the demand for things occidental. Though foods from the West are largely luxury purchases for the Eastern peoples, the sum of such purchases is reaching impressive amounts because the desire for occidental articles seems to be best satisfied by food. To derive the maximum benefit from this type of demand, food specialists of the Commerce Department believe that the American food industry will have to employ different methods—especially in connection with packaging—than it uses in the domestic and European trades.

In Japan, for instance, representatives of the Commerce Department have found that there is a wide-spread custom of giving American canned foods as presents. According to these representatives, the Japanese make up these gifts by placing several cans of fruit or vegetables in appropriately decorated baskets. It is thought that American food producers could benefit from this custom even more than they now do if they should prepare special cartons of cans of assorted fruits and vegetables. Japan is expected to become a larger export market for American canned food with the reduction of the high import duty brought about by the earthquake.

The same demand for American prepared foods is believed to exist elsewhere in the Orient to satisfy the increasing desire for occidental products. The rapid introduction into Eastern countries of occidental commerce and ideas is increasing this demand. In the larger cities of Japan it is said to be quite common for the clerical workers to eat an entire occidental mid-day meal. The food division of the Commerce department is making an extensive survey of the possibilities of the market in the Dutch East Indies. Although no recent figures are available, it is believed that there is an impressive increase in the amount of American foods consumed by the Chinese market.

Legislation Under Discussion

Interest among government food specialists is being renewed as to the status of the senate bill proposing the licensing of commission merchants engaged in interstate commerce in perishable commodities. This bill, which was introduced by Senator Borah, was approved by the Senate Committee on Agriculture and Forestry.

Because of the great number of changes that have been proposed in the bill, it is thought that hearings probably will be held during the coming short session. Proponents of the bill have indicated that in their opinion better results could be obtained if the Secretary of Agriculture, who is charged with enforcement of the measure, were empowered to proceed on his own motion. It is pointed out that as the purpose of the bill is to prevent unfair practices in the handling of fresh fruit and vegetables, better administration would be possible if those in charge of the execution could take direct action in cases of violation instead of waiting until such violations were brought to their attention.

Quality Determines Sales

Lessons being learned in the successful introduction of American fresh fruits into Europe indicate clearly the advantages that come to dealers in brands of high quality and to those who make careful arrangements in advance for the distribution of their export products. It is held that the intelligent way in which the California Fruit Growers' Exchange handled its exports is responsible for the establishment of a permanent market for American oranges in areas where the growers of Spain and of Palestine enjoy great advantages. The successful way in which the competition of the low-cost Spanish oranges, and the high-quality fruit from Palestine, has been met is held to be an indication of what may be accomplished on behalf of other American food products. The importance of quality is illustrated by the fact that early shipments of grape fruit into the United Kingdom included a considerable proportion of carefully selected fruit stamped with its own trademark. This particular brand continues to be a marked favorite in the British market, despite the fact that other quality grape fruit may be had at a lower price.

Canned Poultry to Be Certified

Inspection of canned poultry products is being undertaken by the Bureau of Agricultural Economics. This service is available at cost on request and is not compulsory. As a result, canned chicken items from the United States, which have been barred from Canada for the past few years by the Canadian "Meat and Canned Foods Act" requiring federal inspection, are now being accepted in Canadian markets. The government inspection also meets the requirements of the New York City Board of Health which stipulate that all poultry products sold in the city be certified by an acceptable agency.

The bureau will enter into an agreement with a producer on condition that the plant is equipped to handle poultry in a sanitary way and that all the poultry may be inspected. Several companies have availed themselves of the service and in some plants movable inspection tables and sterilizing devices

have been installed. Products so passed are labeled "Inspected and certified by the Bureau of Agricultural Economics, U.S.D.A." Advocates of this system point out that the manufacturers who take advantage of it will benefit by entry into restricted markets and that eventually there will be an increased domestic demand for certified products.

Bay of Fundy to Be Impounded

Fishing and canning interests about the Bay of Fundy are likely to suffer severe losses as a result of the proposed Passamaquoddy Bay power development, according to Dr. A. G. Huntsman of the Biological Board of Canada as quoted in a bulletin of the U. S. Bureau of Fisheries. Dr. Huntsman predicts that the power project would greatly reduce the production of herring, sardines, pollock, haddock, cod, and clams, thus injuring fisheries both in the United States and Canada as well as the canning and packing interests in Eastport, Maine, one of the state's largest industries. An international committee has been formed to study the situation and report on the probable effect of the development.

It is held that the famous high tides which boil in and out of Passamaquoddy Bay twice a day form a great mixing bowl so that water of high salinity is drawn from the ocean depths and flows at a higher level. This is claimed to furnish important salts and an evenness of temperature favorable to the growth of organisms on which the fish feed. Completion of the power project would unquestionably limit this mixing effect as the water would be impounded by dams and bay levels kept nearly constant. The effect on fisheries, however, is as yet a subject of controversy.

Grading of Turkeys Now in Effect

Preparations are being made for government grading of turkeys prior to the Thanksgiving and Christmas trade. This service was tried out last year in cooperation with the Piggly Wiggly Stores of Washington, D. C. It was felt that sales increased and customer satisfaction was much greater. From this successful start, the service is to be greatly extended this year. Many carloads of turkeys will be inspected at points throughout the east: In New York, Washington, Boston, Providence, Albany, and other cities. Requests are coming in from other localities.

Each bird passed by the graders will be stamped on its back "U. S. Prime" and will also bear a tag with a certification and the date. The graders' time will be paid by the companies served. This work is being carried on by the Bureau of Agricultural Economics under R. R. Slocum and R. C. Potts.

A second survey to determine the stocks of canned corn, peas and tomatoes on hand at the end of the current year is to be conducted by the Bureau of the Census. This, together with last year's inventory survey and the production figures for 1928, will make it possible to determine for the first time the annual consumption of these items. Questionnaires will be sent out early in January and the final result will be published as soon as the returns are in. It is understood that this report will come out far enough in advance to serve as a guide for production.

The equivalent of 279,000,000 of unshelled peanuts was used in American candy last year according to the National Confectioners' Association. This represents about 40 per cent of the domestic consumption.

Cocoa Statistics by Telegraph

Cocoa production estimates and quotations arriving from the African Gold Coast are now being sent out telegraphically by the Department of Commerce. This service is the first of its kind undertaken by the government. Immediately on receipt of cabled news telegrams are sent, collect, to all companies desiring the service, thus distributing market reports a week in advance of the mimeographed releases which follow. Information is based on advices from L. J. Schwarz, American trade commissioner at Accra. Inasmuch as the Gold Coast leads the world in cocoa production and furnishes over a third of the demand in the United States, this country's imports amounting to a total of sixty million dollars annually, the new service has been welcomed by many.

Washing Apples and Pears for Market Reported in Northwest

The washing of apples and pears in preparing them for market in the Pacific Northwest is a recent development in fruit packing. This practice, begun about two years ago, is designed to remove from the fruit the excess spray residue considered objectionable in some markets. The process of washing is discussed in detail in a mimeographed circular, "Studies on the Removal of Spray Residue from Apples and Pears," which may be procured from the Bureau of Plant Industry, U. S. Department of Agriculture.

The washing consists of first passing the fruit on conveyors through sprays of dilute hydrochloric acid, then rinsing thoroughly in clear water, and drying either with an air blast or with towels. A dilute alkali is used sometimes in place of the hydrochloric acid. When properly applied, this treatment does not injure either the appearance or keeping quality of the fruit in storage, according to experiments conducted by the Bureau of Plant Industry and corroborated by results obtained by shippers of washed fruit in 1927, and by a general survey of washed and unwashed apples in commercial storage last February.

AS MAY safely be assumed at the inception of a new journal, the editors of *Food Industries* will welcome contributed articles of an appropriate sort.

Also, and especially, will they be glad to receive their full quota of the less extensive and somewhat informal communications that come naturally and in generous volume to established periodicals, and concern such things as:

—new or improved machinery, described by operating men in the industry or in related industries;

—the use of materials in ways differing from the custom, either as to proportions or product;

—personally developed betterments in plant equipment or practice that might qualify for inclusion among Practical Operating Details;

—new types of packaging;

—news items of a commercial or personal nature.

For such contributions as are published and that seem to be of constructive service to the readers of *Food Industries* adequate payment will be made.

Corn Sugar in Cuba?

According to Henry S. Brandt, secretary of a special committee of the National Sugar Mill Owners' and Planters' Association, of Cuba, the cane sugar industry of that country is menaced by corn sugar and the committee's report urges that members consider the possibility of converting existing mills into corn sugar manufactories. The report has not yet been adopted.

Allied Packers Sold

Announcement of the plans for the sale of the assets of Allied Packers, Inc., to Hygrade Food Products was made Nov. 20, by George W. Davison, president of the Central Union Trust Company of New York. Under its terms the Hygrade company acquires the five plants of the Allied Packers. Frank R. Warton, president of Allied Packers, becomes chairman of the board.

Two Corporations Entitled to Use "Del Monte" Trade Name

The continued use of the trade mark "Del Monte" on coffee, which has been in use since 1887, by Tillman and Bendell, Inc., was held to be the right of that firm in the opinion of Assistant Patent Commissioner Kinnan in the case of the California Packing Corporation vs. Tillman and Bendell, Inc.

The original Tillman, founder of the Oakland Preserving Company, which later was absorbed into the California Fruit Canners Association and subsequently became a part of the California Packing Corporation, was also at that time senior member of Tillman and Bendell, Inc. While he was a member of the latter firm the name "Del Monte" was used by it upon coffee and later when he engaged in the canning business appears to have advocated the use of the same name for the products of that industry.

The commissioner held that due to long acquiescence in this use both parties had abandoned their rights to interfere with such use by the other.

Tillman and Bendell, Inc., recently seeking to include registration of this trade mark to cover spices and food flavoring extracts, was opposed by the California Packing Corporation. The opinion states that Tillman and Bendell, Inc., may continue to use the trade mark upon coffee, but are not entitled to extend its use to the other products which it desired to cover.

Ice Company Merger

The consolidation of five large ice companies in New England, to be called the National Service Companies, will form the third largest ice company in the United States. The companies thus uniting are the Metropolitan Ice Company, the New England Cities Ice Company, the Rhode Island Ice Company, the Southern New England Ice Company and the Westchester Service Company.

The combined ice sales for this group last year totaled 1,275,520 tons. The properties include seventeen artificial ice plants as well as natural ice reserves and several coal yards.

Cuban Sugar Restriction Opposed

A Havana dispatch to the *Wall Street Journal* for November 8 says: "By unanimous vote of its membership throughout the island, the National Association of Sugar Producers of Cuba went on record as opposed to any restrictions on the growth of cane and manufacture of sugar, asking the President of the Republic to lift restrictions. At the same time this association voted for dissolution of the Cuban Sugar Export Corporation, a governmental agency created in 1927 for the sale of the crop abroad."

Mayonnaise Makers Meet

At the third annual convention of the Mayonnaise Manufacturers Association, at Boston, October 29 to 31, C. P. McCormick, of Baltimore, was re-elected president. Many papers of technical and economic import were read by members and guests.

Partnership Announced

Announcement has been made of the formation of the partnership of S. C. Bloom and Charles F. Kamrath to conduct a consulting and architectural engineering business, with offices in the Monadnock Block, 330 South Dearborn Street, Chicago. Their activities will cover the broad field of air conditioning and refrigeration, industrial applications of ozone, high and low temperature drying systems.

Mr. Bloom is a graduate of Purdue, 1909, and for many years was vice-president of the Atmospheric Conditioning Corporation. He was intimately connected with the development of brine spray refrigeration in the packing house.

S. C. Bloom

C. F. Kamrath

Mr. Kamrath has been identified with the packing industry all his life, beginning with his father in Dayton, Ohio, and joining Swift & Company in 1898. Since 1907 he has been a designer and superviser of erection of packing plants, among which may be mentioned: E. H. Stanton & Company, and Carstens Packing Company, Spokane, Wash.; Great Falls Meat Company, Great Falls, Mont.; Nuckolls Packing Company, Pueblo, Colo. Also he was a member of the firm which designed the plants of the Twin City Packing Company, Menominee, Mich., and the Dold Packing Company, Omaha, Neb.

To Study Sugar

The Federal Sugar Refining Company is planning to establish a complete research laboratory for the study of sugar as a raw material for manufacture of other substances. This will cover both edible and non-edible uses of sugar, and will include refining. The results of these studies are expected to broaden the uses of refined sugar.

The plan of the research committee of the Sugar Institute, headed by Rudolf Spreckels, to have the work carried out by the institute has been abandoned, but Mr. Spreckels announces that his company will undertake this work alone.

Modern Equipment in Mushroom Culture

Three Universal Cranes are used on the mushroom farm of Edward H. Jacob, West Chester, Pa. The cranes are not for handling mushrooms, but are employed in handling the 1,100 cars of fertilizer and 1,000 tons of soil required for the production of the edible fungus that are produced on a 200-acre farm.

Libby Buys Pauwela Pineapple Company

Libby, McNeill & Libby has recently given notice to the Pauwela Pineapple Company that it would exercise its option to purchase properties and business of that company which are located on the Island of Maui, in the territory of Hawaii.

This is the consummation of a contract entered into with the Pauwela Pineapple Company in April, 1926.

The Libby company acquires the Pauwela cannery located in the Haiku section of the Island of Maui, and takes over its entire business, equipment and property.

PERSONALS

Changes in Fruit Products Staff at U. of California

As result of his well-known investigations on the preparation of fruit beverages, J. H. Irish, of the Fruit Products Laboratory of the University of California, has been asked to direct the building and operation of a new fruit juice factory in Oakland, Cal. The new company is well financed and gives promise of becoming an important factor in the fruit beverage industry. In order to make this possible Mr. Irish has been granted leave of absence for a year. His work at the University of California is being continued by M. A. Joslyn and H. B. Farley. Mr. Joslyn has been with the Fruit Products Staff for the past two years in the capacity of graduate research assistant. Mr. Farley has until recently served as a graduate assistant in the Maryland College of Agriculture under Dr. E. C. Auchter. At the present time Joslyn and Farley are investigating the utilization of California grapes for carbonated beverages and have developed a moderate priced carbonated drink which gives promise of becoming a strong competitor of some varieties of synthetic drinks.

Prof. A. W. Christie, formerly in charge of dehydration and sun-drying investigations and instruction at the University, has recently taken the position of field manager in the California Walnut Growers Association with headquarters in Los Angeles, Cal. In his new position, Professor Christie has

an excellent opportunity to make use of his training and experience in dehydration. Mr. Nichols has taken up Professor Christie's former duties at the University and is vigorously prosecuting important investigations on the sun-drying and dehydration of apricots, peaches, prunes, and grapes.

He has given particular attention to the SO_2 problem in cut dried fruits and to efficiency problems connected with the operation of driers. Mr. Nichols is probably well known to some readers of this journal through his former association with the U. S. Department of Agriculture where he was in charge of dehydration investigations on the Pacific Coast. He also served for two years as research chemist for the Sun-Maid Raisin Growers, of California. In addition to his research, Mr. Nichols will conduct a lecture course at the University on the sun-drying and dehydration of fruits and the packing of dehydrated fruits and vegetables.

HAROLD F. WHITTAKER is general manager of Vim Food Products Company, Buffalo.

A. A. JACKSON is in charge of the sales of decolorizing carbons of the Glidden Food Products Company.

N. C. COAN has resigned from the sliced beef and canned meat division of the Illinois Meat Company, Chicago.

DR. KUTSCH has resigned from his position of superintendent of the by-product department of the Sun Maid Raisin Growers and has returned to the Staley Manufacturing Company, Decatur, Ill.

R. I. BENTLEY, president of California Packing Corporation, is chairman of the export committee of the California Development Association, which has under advisement plans for a large cold-storage warehouse on the Pacific Coast.

ARTHUR MEEKER, vice-president and director of Armour and Company, announced his retirement from active participation in the company's affairs. His retirement comes at the end of forty-three years of service with the company.

FRED GERNAND, Volga City, Iowa, won the first award in the Cold-Storage Butter Contest held at the Dairy Industries Exposition in Cleveland. The second and third awards were given to H. T. Hangartner, Clermont, Iowa, and M. A. Nielson, Harris, Minn.

E. B. DEMING, Bellingham, Wash., head of the Pacific-American Fisheries and of Deming and Gould Company, has been elected a director of the First National Corporation of Seattle, a corporation owning six banks in that city whose combined resources total $35,000,000.

DR. H. E. BARNARD has re-acquired The Commercial Laboratories, Indianapolis. This laboratory was started some years ago by a relative who later died. The business was taken over by Doctor Barnard and later turned over to his associate, Mr. W. D. McAbee, who operated it until his death in September of this year, as reported in November *Food Industries*. Doctor Barnard has again assumed the direction of the laboratory.

OBITUARY

LORENZ R. SCHWERIN, president of the Casein Company of America, milk converters, died Nov. 14 at his home in New York City at the age of fifty-nine. He had been in ill health for two years, but did not retire from active business until six months ago.

WILLIAM SUCKOW, founder of the Suckow Milling Company, Franklin, Ind., died Oct. 25, 1928, at the age of 77. Mr. Suckow, who had been suffering from heart trouble, retired from active business ten years ago. His sons William W. and Karl H. Suckow have operated the business since his retirement.

· NEW · CONSTRUCTION ·

Factory and Equipment Requirements

Bakery—Colonial Baking Co., c/o J. A. Walsh, 1500 Fifth Ave. E., Cedar Rapids, Ia., awarded contract for a 1 story, 120 x 150 ft. bakery at 800 Fifth Ave. E., to Fogel Construction Co., 619 Reliance Bldg., Kansas City, Mo. Estimated cost $55,000. Equipment to cost $100,000 will be installed.

Bakery — Corp., c/o L. Gottlieb, 10 Avenue C, Brooklyn, N. Y., plans the construction of a 1 story, 100 x 100 ft. bakery at 86th St. and Bay 17th St. Estimated cost $40,000. J. J. Millman, 26 Court St., Brooklyn, N. Y., is architect.

Bakery—General Baking Co., 420 Lexington Ave., New York, N. Y., is having preliminary plans prepared for the construction of bakery at Georgia Ave. and W. St. N. W., Washington, D. C. Estimated cost $200,000. C. B. Comstock, 110 West 40th St., New York, N. Y., is architect.

Bakery — D. S. Kilpatrick, 1501 Daisy Ave., Long Beach, Calif., will build a 1 story, 65 x 75 ft. addition to bakery. Estimated cost $10,000.

Bakery—E. H. Koester, 648 West Lexington St., Baltimore, Md., awarded contract for a 2 story addition to bakery to Adam Kratz & Son, 118 Carrolton Ave., Baltimore, Md.

Bakery—D. Perlman, 813 Allerton Ave., New York, N. Y., plans the construction of a 2 story, 100 x 110 ft. bakery at White Plains Rd. and Marce Ave. Estimated cost $30,000. R. Gottlieb, 708 Tremont Ave., New York, N. Y., is architect.

Bakery—E. V. Schmitz, 3226 Montgomery Way and H. W. Robertson, 3925 First Ave., Contr., Sacramento, Calif., awarded contract for a 50 x 80 ft. bakery on Montgomery Way. Estimated cost $25,000.

Bakers' Supply Factory—Griffith Laboratories Co., 4103 South La Salle St., Chicago, Ill., awarded contract for the construction of a 2 story, 76 x 115 ft. factory for the manufacturer of bakers' supplies at 1415-25 West 37th St. to Persons Construction Co., 1551 East 75th St., Chicago, Ill. Estimated cost $50,000.

Candy Factory—Loft Inc., Vernon Ave., Long Island City, N. Y., plans the construction of a 3 story, 50 x 95 ft. candy factory at Hamilton St. and Freeman Ave. Estimated cost $75,000. W. Higinson, 101 Park Ave., New York, N. Y., is architect.

Candy Factory—Sperry Candy Co., 140 Reed St., Milwaukee, Wis., will soon award contract for a 5 story, 50 x 140 ft. factory on Pittsburg St. C. H. Thoringer & J. Bruecker, 774 3rd St., Milwaukee, Wis., are architects.

Cannery—S. J. Lubin, Pres., Sacramento Region Citizens Council, Sacramento, Calif., representing eastern capital, plans the construction of a cannery either in San Francisco or Sacramento. Estimated cost $5,000,000.

Canning Factory—Faribault Canning Co., Faribault, Minn., plans the construction of a canning plant including laboratory, corn drying room, warehouse etc. Estimated cost $16,000. R. W. Richardson, 301 Zenith Bldg., St. Paul, Minn., is engineer. Complete equipment will be required.

Canning and Pickling Plant — Masden Farm Development Co., c/o H. H. Masden, Pres., Big Wells, Tex., is developing 7,000 acres of land for truck and vegetables. Will establish canning and pickling plants. Private plans.

Car Icing Plant, etc.—Pacific Fruit Express Co., 65 Market St., San Francisco, Calif., awarded contract for the construction of a refrigerator car icing plant and 14 x 1,000 ft. platform at Consumers Ice & Cold Storage Co.'s plant here, for icing fruit cars to Barrett & Hilp, Embarcadero St., San Francisco, Calif.

Chocolate Factory Equipment — Walter Baker & Co. Inc., Adams St., Milton, Mass., chocolate manufacturers, is in the market for new machinery for proposed 3 story factory.

Cold Storage Plant — Central Power & Light Co., Frost Bldg., San Antonio, and F. O. Ludden, Mgr., San Benito, plans the construction of a cold storage plant at Harlingen, Tex. Estimated cost $50,000. Private plans.

Cold Storage Plant—Pearce-Young Angel Co., Greenville, S. C., will soon receive bids for the construction of a 2 story, 75 x 125 ft. cold storage plant.

Cold Storage Plant—Lewis Grocery Co., M. Lewis, Pres., Durant, Miss., is having preliminary plans prepared for the construction of a cold storage plant. Estimated cost $50,000.

Cold Storage Plant—J. E. Morgan, San Juan, Tex., is receiving bids for the construction of a 2 story, 80 x 160 ft. cold storage plant including equipment at Donna, Tex. Estimated cost $75,000. Private plans.

Cold Storage Plant—Jones Cold Storage & Terminal Corp., A. P. Jones, Pres., Norfolk, Va., is having preliminary plans prepared for the construction of a 6 story, 90 x 120 ft. cold storage plant including two freezers, ten coolers, ventilation machinery, etc.

Cold Storage Warehouse—Victoria Cold Storage & Terminal Warehouse Co. Ltd., Victoria, B. C., awarded contract for the construction of a cold storage warehouse at Ogden Point Rocks, to Parfitt Bros. Ltd., 1303 Gladstone Ave., Victoria, B. C. Estimated cost $400,000.

Condensed Milk Plant—City Dairy Co. Ltd., Spadina Crescent, Toronto, Ont., awarded general contract for the construction of a condensed milk plant at Princeton, Ont., to James A. Vance, Woodstock, Ont. Estimated cost $125,000.

Creamery — Waupaca Co-operative Creamery Co., L. A. Olson, Mgr., Waupaca, Wis., is having plans prepared for the construction of a 2 story creamery. Estimated cost $35,000. C. Moe, 610 Kasota Bldg., Minneapolis, Minn., is architect.

Creamery—Snowbite Creamery Co., 127-29 North Chadbourne St., San Angelo, Tex., plans the construction of a 1 and 2 story, 140 x 164 ft. creamery at Second and Gillis Sts. Estimated cost $100,000. R. K. Hamberlin, 807 Builders Exchange Bldg., San Antonio, Tex. and H. I. Messick, 212 Ricker & Dodson Bldg., San Angelo, Tex., are architects. Machinery and equipment will be required.

Creamery Addition—Adohr Stock Farms, Los Angeles, Calif., awarded contract for a 1 story addition to creamery on Ventura Blvd., to H. A. Nichols, 936 East Saluson Ave., Los Angeles, Calif. Estimated cost $10,000.

Creamery Distribution Plant—Wisconsin Creameries Inc., 342 6th St., Milwaukee, Wis., awarded contract for a 3 story, 105 x 152 ft. distribution plant to E. Steigerwald & Sons Co., 5310 State St., Milwaukee, Wis.

Creamery and Butter Plant — Wilson & Co., U. S. Yards, Chicago, Ill., plans the construction of a creamery and butter plant at Altus, Okla. Estimated cost $60,000. Private plans.

Creamery and Butter Plant—Challenge Creamery & Butter Association, 807 Montgomery St., San Francisco, Calif., plans the construction of a creamery and butter plant. Estimated cost $40,000.

Creamery and Milk Pasteurizing Plant—Quality Milk Co., C. Ward, 210 North 10th St., Fort Smith, Ark., will build a 2 story, 140 x 150 ft. creamery and milk pasteurizing plant. Cable Engineering Co., Dallas, Tex., is engineer. Owner builds with local labor under supervision of engineer.

Dairy Products Plant—Silverwoods Ltd., A. E. Silverwood, Mgr., London, Ont., awarded contract for a 1 and 2 story dairy products plant on Welland Ave., St. Catherines, to T. F. Jones, 167 Church St., St. Catharines, Ont. Estimated cost $75,000. Owner is in the market for special equipment for the manufacture of dairy products, also refrigeration equipment.

Dehydrating Plant—Bulmans Ltd., Vernon, B. C., plans the construction of a dehydrating plant. Estimated cost about $150,000.

Extract Manufacturing Plant — V. V. Campbell & Co., Reno St., Oklahoma City, Okla., plans the construction of an extract manufacturing plant at 27th and Santa Fe Sts. Estimated cost $65,000. Private plans.

Fig Preserving Plant—Tyrrell & Garth Investment Co., League City, Tex., plans the construction of a 1 story fig preserving plant, steam and electrically operated 2,000,000 lbs. season capacity. Estimated cost including equipment $60,000.

Flour Mill — The Always-A-Head Mills Inc., 35th St. and Southern Ry., East St. Louis, Ill., awarded contract for the construction of a 6 story, 60 x 140 ft. flour mill, elevator section will contain nineteen bins and manufacturing section thirty-seven work bins, 40,000 bu. capacity each to Humphries Contracting Co., Pierce Bldg., St. Louis, Mo.

Grain Elevator—C. D. Howe & Co., Port Arthur, Ont., Engrs., are preparing plans for the construction of a grain elevator, 1,000,000 bu. capacity at Fort Churchill, Ont.

Grain Elevator—Canadian Rail & Harbor Terminal, ft. of York St., Toronto, Ont., plans the construction of a grain elevator, 1,000,000 bu. capacity at Meaford, Ont. Estimated cost $500,000. C. D. Howe & Co., Wahalen Bldg., Port Arthur, Ont., are engineers.

Grain Elevator—Sarnia Elevator Co., J. Playfair, Sarnia, Ont., is having plans prepared for grain elevator, 2,000,000 bu. Estimated cost $650,000. Private plans. Owner is in the market for complete grain handling equipment.

Grain Elevator—Willison Neely Co., 805 C. P. R. Bldg., Toronto, Ont., plans the construction of a grain elevator on the waterfront. Estimated cost $400,000. Private plans.

Grocery Warehouse—Frankford Grocery Co., Inc., J. A. Edward, Pres., Penn. and Unity Sts., Philadelphia, Pa., is having plans prepared for the construction of a 4 story addition to warehouse. Estimated cost $200,000. W. E. S. Dyer, Land Title Bldg., Philadelphia, is architect.

Grocery Warehouse — John Sexton Co., 352 West Illinois St., Chicago, Ill., awarded contract for substructure of a 6 story, 100 x 175 ft. wholesale grocery warehouse at Illinois and Orleans Sts.

Ice Cream Factory—Collins Ice Cream Co., W. C. Collins, 332 South Michigan Ave., Chicago, Ill., awarded contract for the construction of a 2 story, 125 x 150 ft. ice cream factory at State St. S. Estimated cost $75,000.

Ice Cream Manufacturing Plant—Mitchell Dairy Co., 745 North Ave., Bridgeport, Conn., plans the construction of an ice cream manufacturing plant on North Ave. Estimated cost $40,000. Architect not selected.

Ice Cream Manufacturing Plant Addition—Maryland Creamery Co., 1726 East Pratt St., Baltimore, Md., is having revised plans prepared for a 3 story addition to ice cream manufacturing plant at 127 Register St. Estimated cost $200,000. McCormick & Co., 121 South Nagley St., Pittsburgh, Pa., are architects.

Ice Manufacturing Plant — City Ice & Fuel Co., C. C. Coneby, 6611 Euclid Ave., Cleveland, O., is having plans prepared for the construction of a 1 story, 100 x 100 ft. ice manufacturing plant, also receiving bids for a 1 story, 100 x 100 ft. ice plant at Willoughby, O. Estimated cost $100,000 each. Private plans. Equipment purchased.

Ice Manufacturing Plant Addition—Milton Ice Co., 45 Babson St., Mattapan, Mass., awarded contract for a 1 story addition to ice manufacturing plant, to W. T. Reed Co., 201 Devonshire St., Boston, Mass.

Ice Plant—Earl W. Baker & Co., Perrine Bldg., Oklahoma City, Okla., has made application for permit to construct a 10 ton raw water ice plant at Bethany, Okla. Estimated cost $25,000. Private plans.

Ice Plant—Boston Ice Co., 11 Deerfield St., Boston, Mass., awarded contract for the construction of a 1 story, 125 x 150 ft. ice plant on Philips Court to Vappi & Ferguson, 552 Massachusetts Ave., Cambridge, Mass. Estimated cost $75,000.

Ice Plant—Central West Public Service Co., c/o Consumers Ice Co., c/o J. Mallory, Mgr., Sioux City, Ia., plans the construction of an artificial ice plant. Estimated cost $135,000.

Ice Plant—Henry Coal & Ice Co., A. R. Henry, Pres., Barberton, O., awarded contract for the construction of a 1 story, 90 x 100 ft. ice plant to Bernard Construction Co., 221½ Third Ave., Barberton, O. Estimated cost $100,000.

Ice Plant — Lufkin Ice Co., c/o J. L. Phillips, Pres., Lufkin, Tex., plans the construction of a 1 story ice plant. Estimated cost $100,000. Private plans.

Ice Plant — Santa Fe Railway Co., Bakersfield, Calif., awarded contract for a 1 story, 100 x 183 ft. ice plant to Robert E. McKee, 1128 Central Bldg., Los Angeles, Calif. Estimated cost $72,600.

Ice Plant — Seaboard Ice Co., Second and Union Aves., Long Branch, N. J., will build a 40 ton ice plant on Hulock St. Estimated cost $40,000. M. Smith, 2 Lafayette St., New York, N. Y., is architect. Work will be done by separate contracts.

Ice Plant—Taylor-Easterling Co., Tulsa, Okla., is having preliminary plans made for the construction of a 10 ton raw water ice plant at Coyle, Okla. Estimated cost $25,000. Private plans.

Ice Plant—H. E. Walker and E. L. Ambuster, Purcell, Okla., plan the construction of an ice plant at Lexington, Okla. Estimated cost $25,000. Private plans.

Ice Plant—Zero Ice & Cold Storage Co., 729 West Grand St., Oklahoma City, Okla., plans the construction of a new 20 ton ice plant at Britton near Oklahoma City. Estimated cost $30,000. Private plans.

Ice Plant and Factory—George R. Lochrie, Raymondville, Tex., plans the construction of a 40 ton ice plant. Estimated cost $50,000. Private plans.

Ice Storage Plant—Pacific Fruit Express Co., H. T. White, Asst. Gen. Mgr. & Engr., Southern Pacific Bldg., 65 Market St., San Francisco, Calif., will soon award contract for additional facilities to ice storage plant to include 100 ton capacity ice storage building, ice unloading platform, etc. Private plans.

Ice and Cold Storage Plant — Artificial Ice & Cold Storage Co., C. A. Cell, Gen. Mgr., 316 West Hoio St., Indianapolis, Ind., is having plans prepared for the construction of a 1 story addition to ice plant at 42nd and Winthrop Sts.

Milk Bottling and Distribution Plant—Roberts & Roberts, 105 North Clark St., Chicago, Ill., Archts., will receive bids about Dec. 3, for the construction of a 2 story, milk bottling and distribution plant at Forest Park, Ill. for Bordens Farm Products Co., 326 West Madison St., Chicago, Ill. Estimated cost $200,000.

Meat Distribution Plant—Swift & Co., 60 North Market St., Boston, Mass., will soon award contract for a 2 story, 75 x 80 ft. meat distribution plant at Charles and Middlesex Sts., Malden, Mass. Estimated cost $85,000. Private plans.

Milk Depot — Ferndale Farms Inc., I. Kotcher, Pres., 1678 Bergen St., Brooklyn, N. Y., plans the construction of a 2 story, 100 x 200 ft. milk depot at Liberty and Snediker Aves. Estimated cost $40,000. E. M. Adelsohn, Inc., 26 Court St., Brooklyn, N. Y., is architect.

Milk Plant — Ingersoll Bowditch, 111 Devonshire St., Boston, Mass., awarded contract for the construction of a 1 story milk plant on Somerville Ave., Somerville, Mass., to Walsh Bros., 150 Hampshire St., Cambridge, Mass. Estimated cost $50,000. New England Products Co., 43 Somerville Ave., Somerville, Mass., is lessee.

Milk & Ice Cream Plant—Welch Milk Co., C. W. Bennett, Welch, W. Va., will receive bids about Dec. 1 for the construction of a milk and ice cream plant. Estimated cost $15,000. Maryatt Alvin Watkins, 409 First National Bank Bldg., Welch, W. Va., is architect.

Milk and Ice Cream Plant — Metzger Dairies Inc., C. Metzger, Pres., Dallas and Amarillo, Tex., plans the construction of a milk and ice cream plant at San Antonio, Tex. Estimated cost $60,000. Machinery and equipment for complete plants will be required.

Packing House—Piru Citrus Association, Piru, Calif., awarded contract for a 1 story, 100 x 100 ft. packing house to A. V. Perkinson Inc., 3977 South Vermont Ave., Los Angeles, Calif. Estimated cost $33,000.

Packing Plant—Armour & Co., c/o W. H. Quine, Mgr., 556 Front St., Baton Rouge, La., awarded contract for the construction of a 2 story, 100 x 160 ft. packing plant on Europe St., to John Powers, Chicago, Ill. Estimated cost $100,000.

Packing Plant—Claremont Citrus Assn., Claremont, Calif., awarded contract for a 1 story, 90 x 150 ft. packing plant, to Clarence T. Stover, 11th St., Claremont. Estimated cost $40,000.

Packing Plant — Hovden Packing Co., Ocean View and David Sts., Monterey, Calif., fish packers, awarded contract for a 2 story packing plant to Villadsen, 417 Market St., San Francisco. Estimated cost $50,000.

Produce Plant—Swift & Co., Packers and Exchange Aves., Chicago, Ill., awarded contract for a 3 story, 76 x 127 ft. produce plant, including cold storage, cheese and butter making plants 150,000 lbs. milk daily capacity, also poultry packing and produce and whole milk plants, etc. at West Point, Miss., to Smallman Construction Co., 1109 South 5th Ave., Birmingham, Ala.

Refrigeration Plant — Cudahy Packing Co., 1209 Third St., Sioux City, Ia., awarded contract for one story, 54 x 148 ft. refrigeration plant for packing plant to W. A. Klinger, 417 Warnock Bldg., Sioux City, Ia. Estimated cost $125,000.

Salt Plant Addition—Canadian Salt Co. Ltd., Sandwich St. W., Sandwich, Ont., plans the construction of a 72 x 80 ft. boiler house as addition to plant. Estimated cost $75,000. Private plans. Work will be done by day labor.

Stock Yards—Armour & Co., 208 South La Salle St., Chicago, Ill., awarded contract for the construction of stock yards including forty pens, loading and unloading chutes to C. Johnson, Carroll, Ia. Estimated cost $43,900.

Sugar Refinery—Peoples Sugar Co., N. J. Stringham, Moroni, Utah, is having preliminary plans prepared for the construction of a sugar refinery at Lexington, Neb. Estimated cost $500,000.

Tea Factory—Jewell Tea Co., 5 North Wabash Ave., Chicago, Ill., is having preliminary plans prepared for a 2 and 5 story, 100 x 400 ft. factory for manufacture of breakfast foods, extracts, soaps, etc., at Barrington, Ill. Estimated cost $1,000,000. Holabird & Root, 333 North Michigan Ave., Chicago, Ill., are architects.